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EDITORIAL NOTES—GAS, &c.

A Conspicuous Co-Partnership.

IT must be accounted a matter of singular importance not only in the gas industry, but in the industrial world generally, that the Gaslight and Coke Company have woven into their policy and their general working a scheme of co-partnership with their men. Such a co-partnership under a single company and administration, from the very magnitude of operations and host of employees, has never before been undertaken. But the whole example, and the whole experience, were furnished by the next largest Company in the gas industry, which Company also surmounted the initial, and what to many would have been disheartening, and felt to be uncompromising, difficulties. The founder of what has already grown within the gas industry to be a remarkable and substantial object-lesson for the industrial world generally has been removed some three months from the scene of his mundane activities; but the scheme that was laid before the representatives of the employees of the Gaslight and Coke Company last Thursday was being matured by the Governor (Mr. Corbet Woodall), his colleagues, and the management, and was within the knowledge of Sir George Livesey, some time before his death. It is a curious but befitting thing that the last year of the life of the pioneer of the conciliatory and ameliorating movement that has no like in the annals of labour, should have witnessed such a magnificent spurt in adoption; and it is a crowning success to have the Gaslight and Coke Company, with their army of some 11,000 officers and employees, throwing their whole weight and influence into the principles and established merits of that movement. It is for co-partnership a potential gain, the value of which cannot possibly be assessed either inside or outside the gas industry.

With such an addition to what existed before, it is impossible to say, with the confirmation of the grand success already achieved within their limits by the pioneer companies, what will be the effect upon the industrial life of the country. Of this we feel assured, that the success of co-partnership cannot long continue to receive such illuminating evidences of mutual value as between capital and labour as it has already done, without, where employers do not voluntarily offer, the men themselves desiring, and, from desiring, asking, for participation in it. And who can blame them if they do this? They find that the scheme does not mean any sacrifice of wages, that there is no actual curtailment of liberty; but that, as a matter of fact (as the "Spectator" put it recently when discussing Lord Rosebery's address on thrift), the possession of even a small amount of capital gives a greater freedom and independence than is enjoyed where no such property exists. And supplementing this, no intelligent worker, no unprejudiced employer, can fail to discern, where co-partnership lives, an increased interest in the day's labour, and an increased happiness in life and in the closer relationship with employer and industry—all the effect of the opportunity to the worker to produce and accumulate capital which, in turn, provides its own work. We cannot, as has been said before in these columns, imagine labour devoted to a more productive end, or the labourer having a greater ambition. When one can, as Mr. Woodall did on Thursday, point to the fact that, in London and Suburban gas undertakings, through co-partnership alone, there is invested, in the names of officers and men (this is not anything like the total of the profits distributed among them since the scheme started), more than £400,000, bringing an income of nearly £20,000 per annum, and that this sum is increasing year by year, it should be sufficient to make the most fervid Socialist desire to mend his ill-devised ways to the goal that is attained by the shorter and clear route of co-partnership.

The meeting of the Directors of the Gaslight Company with no less than 460 representatives of officers and men was in itself eloquent of one of the attributes of co-partnership. The system of joint capitalized enterprise brought in its train infinite advantages, and not a few disadvantages, one of which was to create a division between master and man, which time has widened. But it is a curious matter for contemplation, that the world has been content to work on gathering in the advantages without making any serious and universal attempt to remove the disadvantages. The disadvantage—and it is a very material one—of the division between the provider of work and the worker has been shown to be capable of elimination by co-partnership; and, instead of division, the strands of labour and of capital can by its means be intertwined so as to make (so to speak) one effectively strong rope. The inveterate querist will be asking why, with such advantage accruing, the Gaslight and Coke Company have not set about this work before. The simple explanation is that the Company have not been in the position, financially or otherwise, to do so previously; and possibly never would have been in a position to do so, if the resolute conservatism of the old administration had continued to direct the fortunes of the vast concern. The price of gas to-day is down to 2s. 9d.—which is a figure that no one ever had the courage to anticipate under the former *régime*. Between that price and their standard is 6d.; and therefore it will at once be seen that in this regard, and being in an altogether stronger financial and commercial position than but a very few years ago, the Company have something to offer their men, and so have cheerfully made the offer, and the men are grateful. The principal features and conditions of the scheme will be found outlined to-day in our "Miscellaneous News;" and the thousands of employees are under it being dealt with most liberally, as, in computing the first bonus, the scheme will be retrospective for two years from June 30 next. Therefore, in all cases in which the primary bonus—supplying the "nest-egg"—amounts to £5, the workers will, from July 1 next, be part-proprietors in the concern. Where it is less than £5, the amount will be invested in the names of trustees until £5 has been reached, when the holders will also become proprietors. Ever afterwards the men will have their ordinary wages, their annual bonus, and their dividend on accumulated stock; and this improvement in position will, by vitalizing interest in their work and levelling-up efficiency, give them greater stability in their employment.

There are issues from co-partnership that we place on a far higher plane than the tangible ones that advantage individual and business. But we will not dwell on them now. The fundamental idea of co-partnership is that employers and employed shall all pull the same way in making their business a success not only jointly for themselves, but for those who purchase their staple product. The resolution that was passed—at the instance of Mr. D. Milne Watson, as head of the official staff, and seconded by Mr. George Withers on behalf of the workmen—at the meeting of the delegates with the Governor and the Directors, pledged the representatives to do all in their power to render the scheme as beneficial to the Company as to themselves. It was an historical meeting; and we gladly write the words (which will be read in the far-away future) expressive of confidence that, as the years roll by, they will show that the Governor and Directors of the Company were not deceived at this time in the faith they had in the honour of their men in loyally fulfilling their pledge.

The Municipal Trading Scandal in Marylebone.

THE struggle between the Electric Supply Committee of the Borough of St. Marylebone and the Gaslight and Coke Company for the future lighting of over one-half of the streets in the borough, ended last Thursday in the victory of the supporters of the Municipal undertaking, after a contest in which all the honours remain with the vanquished. We say this in the confident assurance that our opinion will be cordially endorsed by every business man—electrical engineers not excepted—who calmly examines the facts. The question here is not one of gas *versus* electricity, but of honourable municipal administration *versus* dishonourable; and if an electric light company had been treated by a corporation owning its gas-works in the way that the Gaslight and Coke Company have been treated, for the second time, by the Borough Council of St. Marylebone, our opinion and our comments would have been just the same.

A contemporary, the "Electrical Times," not having, we venture to suggest, fully considered the circumstances of the case, thinks that we have admitted that the Marylebone councillors acted wisely in deciding to light Oxford Street by electricity, and will have acted wisely now, because they include in their number men of business and professional experience and eminence. This fact, however, as the history of the street lighting question clearly shows, only proves the extraordinary power of the municipal-trading bias to warp the judgment of such men, and to lead them into countenancing business methods which they would condemn and reject unreservedly in the conduct of their own affairs. Let our contemporary put aside all question of whether it is gas or electricity in which the Marylebone Council were interested as traders, and say whether the methods pursued are really such as commend themselves to its judgment.

To facilitate the formulating of a judgment on those methods, we will very briefly recapitulate the history of this street lighting business in Marylebone. When first the question of Oxford Street lighting came up for consideration, the Borough Council invited schemes and tenders from the Electric Supply Committee and the Gaslight and Coke Company. The tender of the latter was the lower; and, after hearing representatives from both sides, and giving careful and lengthy consideration to the matter, the Lighting Committee recommended the adoption of gas. The Council, however, permitted the Electric Supply Committee to amend their scheme and tender; and they then adopted electricity—avowedly to give business to their own undertaking, although gas had been proved the more efficient and economical in fair competition.

When the Electric Supply Committee set out to capture the remaining street lighting, or as much as it suits them at the present time to undertake, the Council thought it best to ignore the Lighting Committee—who had shown too great a disposition to treat questions on their merits—and to "pack" a Special Committee with a majority of Electric Supply Committee members. This Special Committee adopted, with scant consideration, on no detailed information, and without obtaining any competitive tenders whatever, a scheme put forward by the Electric Supply Committee, which had no basis other than that of a price (£8650 a year) that would just come under the ascertained cost (£8818 a year) of gas lighting, and a nominal illuminating power that was claimed to be 2½ per cent. greater than the illuminating power of some (unspecified) gas-lamps, tested at some unknown time, without the presence or knowledge of the Lighting Committee, the Borough Surveyor, or any other person whose presence and opinion might have proved inconvenient. The Special Committee's report was not circulated other than by being incorporated in the *agenda*, and it contained no detailed information. But it was at once adopted by the Borough Council without ever a trial installation being put up for consideration and approval.

The Gas Company having protested, and having submitted an offer to save the Council £860 a year by gas lighting instead of £168 a year by electricity, the Electric Supply Committee were allowed to reduce their quotation by £1300 a year—thereby reducing the profit, or rather increasing the loss, on the transaction to the electric undertaking, and so not benefiting the ratepayer by a brass farthing. The Council by 26 to 17 votes have approved; members interested in the Gas Company abstaining from voting, while members representing the Electric Supply Committee voted in large numbers.

Such are the facts that justify us in designating the whole business as constituting one of the most barefaced and disgraceful scandals in the history of municipal trading. On the question of gas *versus* electricity for street lighting, and the victory of the latter in this case being, as our contemporary claims, "a sore blow to gas," we need only say that, so long as it remains true, as it is true, that electricity for street lighting has made no progress whatever in London in recent years except in districts where the electricity undertaking is municipally owned, the gas industry—in face of this further proof of how the matter is treated in those cases—have no occasion to regard the question with anything but equanimity.

Interesting Points in Projected Legislation.

THIS week we complete our review of the Bills of the ten statutory Gas Companies who in the forthcoming session are appealing to Parliament for extended powers. The additional capital required, and the necessity for new lands and manufacturing works, are the concomitants of active progress and satisfactory prosperity. In this prosperity, consumers and districts enjoy their full share under the enactments of Parliament. This should always be, though it is not frequently, borne in mind by local authorities when they are considering the fresh projects of the Companies; and when they do give consideration to the matter, it should assist them to temper their requirements, which all too often err on the side of costly extremity.

Over a majority of the Gas Bills this session, it is difficult to see that there can be contention. The Gaslight and Coke Company's Bill—proposing the absorption of the West Ham Gas Company and the reduction of the standard illuminating power of the gas to 14 candles—is almost certain to encounter opposition, in connection with the amalgamation, from the authorities in the area served by the smaller Company. If, in the event, the Local Councils should come to a favourable settlement over the scheme, we shall be very agreeably surprised. But from the proceedings at the meeting of the West Ham Borough Council last Tuesday, and the breadth of the mistaken notions to which some of the members gave vent, agreement is too much to expect. It seems to us, so far as an examination of the conditions can be made, easily capable of proof that the amalgamation will be an economic, and therefore an advantageous, one. This, however, is not the view of certain of the councillors, who think that both the consumers and the shareholders will suffer. There is no occasion for the Council to worry in the slightest degree over the shareholders; and the consumers will be amply protected by the sliding-scale of dividend and price and the vastness of the operations of the larger Company. Of all councillors, it is not a little astonishing to find that Mr. Will Thorne, M.P.—himself an old gas-worker—should be possessed of such erroneous views as he expressed at the Council meeting. He asserted that the Gaslight and Coke Company would, by a lowering of the standard illuminating power from 16 to 14 candles, gain thousands of pounds a year. Does not Mr. Thorne see that, if his assertion is true—the standard in West Ham to-day being 14 candles—the West Ham consumers would, under the sliding-scale, benefit hugely from the supposititious "thousands" to be derived from the lowering of the illuminating power in the Gaslight Company's area. It is also feared by the gas-workers in the West Ham district, that their employment may be in jeopardy; but this should be set at rest by the declaration of Mr. D. Milne Watson, the General Manager of the Gaslight and Coke Company, that the West Ham works will be continued, and only the increase be taken up by the neighbouring gas-works of the larger Company. Anyway, there could not be any transference of manufacture without the necessity of labour elsewhere to cope with it; so that, in the end, so far as labour is concerned, the maintenance of the *status quo* or amalgamation of interests cannot make any difference. As to the standard illuminating power of 14 candles, it would be futile on the part of the Borough Councils in the Gaslight Company's present area to waste breath and money over this, seeing that 14-candle power is the standard for the rest of London, that Parliament has adhered now for some sessions to 14 candles as tested by the "Metropolitan" No. 2 burner as a fit and proper bottom figure under the present-day conditions of more efficient means of utilization, and that the London County Council practically countenanced uniformity of illuminating power throughout the Metropolis but a few sessions since. The promoters of Bills this session are unanimous in asking for

14 candles as the standard, with the modern testing clauses; the repeated refusal of Parliament in recent sessions to go lower no doubt being the deterrent to further endeavour to get as free as possible from a useless test of quality.

While the Bills do not disclose the ground for any particular ruffling of the relations of local authorities and gas companies by parliamentary contest, there does not appear to be support for the hope that the Aldershot and the Yorktown Bills will go through without a struggle between the two Companies and possibly with others; for there is a fair amount of suggestion in the Bills for the repealing of unexercised powers in connection with both gas and electricity supply, and even of competition between the two promoting Companies named in regard to gas supply in a specified area. There is nothing to be said against the repeal, on conditions, of unexercised powers. But we do not like the idea of competition in a district, even though it be but a small area, between two Gas Companies; and it is to be hoped that Parliament will direct a way to the cutting of the Gordian Knot in a manner that will be fair to the parties. In the case of the Heckmondwike and Mirfield Companies, they have a parish in which dual powers of supply exist; but they have come to a compact by which the former will retain sole rights. Extension of areas is one of the orders of the day in connection with gas undertakings having fallow land lying on their boundaries; and such extension proposals include the purchase of small private gasworks by the Aldershot, the Eastbourne, and the Harrogate Companies. The last-named Company have also in their Bill a proposition for obtaining a business footing in areas not ripe for more decisive and comprehensive cultivation by procuring power to engage in the work of providing and installing acetylene, gasolene, or suction-gas plants, with all equipment for the service for which they are required. Still on business enlargement, the Aldershot, the Heckmondwike, and the Leyland Gas Companies ask for authority to supply "power gas," though we cannot see why the Leyland Company should pledge themselves to the supply of "producer "gas, commonly known as Mond gas." The Aldershot and Yorktown Companies are applying direct, in their respective Bills, for electricity powers; while the Wells Company are asking for sanction to apply for a Provisional Order. All of which is evidence of Gas Companies seeking expansion in all the directions that they regard as legitimate to the position they occupy as established concerns with, in consequence, favourable facilities.

There is quite an outburst of desire for capital conversion and consolidation, for in half of the ten Bills—namely, those of the Aldershot, Alliance and Dublin, Eastbourne, Heckmondwike, and Wells Companies—there are schemes with that intent. In several of the measures are found the new auction clause, the limitation of the carry-forward to the equivalent of a year's dividend, and the special purposes fund clause. The Alliance and Dublin Company are asking for exemption from penalty in connection with the presence of a few extra grains of sulphur compounds other than sulphuretted hydrogen in their gas. The Company are one of the few, probably now totalling in number not more than the fingers of the two hands, still under the law condemned by the Departmental Committee four years or so ago, and abrogated since by Parliament whenever opportunity has arisen. There is the clause referred to in a former article (the one dealing with the notices of Bills) put forward by the Heckmondwike Company with the object of empowering them to "refuse to permit any shareholder to peruse the list "of shareholders, or to be supplied with a copy thereof, in "any case where the Directors have reason to apprehend "that such perusal and such copy are not required by any "such shareholder for *bonâ fide* purposes, and in his own "interest as a shareholder in the Company." We venture now to repeat the hope that the parliamentary authorities, notwithstanding their rooted objection to the provisions of General Acts being altered or rendered ineffective in individual cases through Private Bills, will give an opportunity for the reasons being stated for the necessity in these days of discretion in the matter being vested in Boards of Directors, with perhaps some appeal against that decision being provided. If they will only allow the Bill to go before a Select Committee for the discussion of the clause, then the Committee should also be the one—and it should be a strong one—who will be considering the Amman Valley and the Ammanford Gas Bills. The Harrogate Bill contains three clauses of general interest, the gist of which will be found towards the end of our notice of the measure on another page. In relation to them, all that it is necessary to say is that the times have changed, and with the times the conditions of gas use and competition; and amending laws are required to meet these changes. Four Gas Companies seek to alter their titles by extension or contraction. Regarding two of the proposed extensions, it is all very well to have comprehensive titles, but there is no occasion for them to be of such length that they are a strain on the memory.

Purification by Means of Ammonia.

One aspect of the problem dealt with in these columns last week—viz., on the "Revival of Purification by Means of "Ammonia"—on which further emphasis may be laid with advantage, is the scope that it affords for the exercise of the inventive faculty, with every prospect of considerable profit accruing both to the inventor and to the gas industry at large. But much thought and energy may be expended to no purpose, unless the problem is attacked in the direction in which there is the greatest room for immediate improvement. It would appear that the chemical principles of gas purification by means of ammonia have been ascertained and expounded with sufficient lucidity by several workers, and that there is, from the strictly chemical standpoint, small hope of any great advance being made in purification through the agency of causticized liquor. But much remains to be accomplished towards perfecting the means of applying the chemical principles in practice. The physical laws governing solution, evaporation and condensation, and thermal conductivity must all be exhaustively studied, and their bearing on the problem more thoroughly appreciated than hitherto. There is also great opportunity for improvement in the mechanical devices by which the fruits of investigation of the underlying chemical and physical principles are brought to bear on the question. In this (the most promising) direction, something has undoubtedly been achieved in connection with the recent revival of interest in purification by the aid of causticized liquor.

Even in the relatively exhausted field of operations involved in the apparently simple question of bringing a washing liquid in contact with the gas which is to be washed in the most effective manner, much can be accomplished. A tried worker in this field is again busily engaged therein—primarily with the object of improving the well-known washer-scrubber for the extraction of ammonia from gas. But indirectly any improvements in the machine must advance also the cause of the purification of gas from sulphuretted hydrogen and carbonic acid by means of ammonia. It is, therefore, gratifying to us to record that the patent granted to Messrs. Kirkham, Hulett, and Chandler and Mr. Sidney Hersey, for improvements in washer-scrubbers, of the specification of which an abstract appeared in the "Journal" for the 5th inst. (*ante*, p. 43), is already supplemented by a patent of which the provisional specification was accepted on the 12th inst. We have perused a copy of this specification of Mr. Samuel Chandler; and while there are reasons for withholding for the present publication of the full details of his latest ideas on the washing of gas as disclosed by this document, we may say that a notable advance appears to have been made. The inventor has again struck novel ground so far as the rotatory washer-scrubber is concerned; and there is good reason for believing that apparatus of a capacity of 3 million cubic feet per diem will, by the adoption of his present improvement, be equally efficient for 5 millions. Moreover, greater concentration of the effluent liquor should be secured, and even without further adaptation, a more nearly complete absorption of the carbonic acid from the gas. But such an improved washer-scrubber should surely also be adaptable (even if not applicable forthwith) for employment in the purification of gas by means of causticized liquor. One of the chief faults of the early plant used for the latter purpose was its want of compactness and simplicity, whereby great losses of ammonia were sustained. The improvements which Mr. Chandler has now effected in the washer-scrubber aim at compactness and simplicity of this type of plant, which is one likely to be incorporated—with or without modification—in any train of apparatus for the complete purification of gas by a wet process.

Leeds University Gas Lectures.

If involving only reasonable time and expenditure, the staff juniors and pupils of the gas industry have shown a willingness amounting to enthusiasm in taking advantage of the opportunities presented to them for enlarging their store of

technical knowledge and broadening their view on all matters appertaining to gas engineering and management. The observer finds confirmation of this in the excellent position attained and maintained by the Junior Gas Associations of England and Scotland. These Associations are of immense educational worth, and something of which those in chief command of gas undertakings have reason to be proud. In the technical scholastic institutions throughout the country, too, including the chief polytechnics, where the courses do not cut too much into the time that has necessarily to be devoted to practical work by most of the young men of the gas industry, the juniors of the industry may be found assimilating knowledge of those fundamental principles upon which the practice of much of their daily work is erected. They learn of the causes that produce the effects with which they are in common touch day by day, and with which many often become so familiar that there is a proneness to neglect to pause to ask from what sources these effects spring. This observed interest in getting beneath the surface of the ordinary functions and experiences of practical life augurs well for the continuance of a high standard of technical direction in the gas industry under its almost imperceptible, but albeit changing, conditions. That these conditions are ever changing is conclusively shown by a comparison of the present with (say) thirty or forty years since. The mutation will persist until, when similar comparison is made some thirty or forty years hence, the conditions then will in all probability show the same dissimilarity with the present that present conditions do with the past. On the main subject, however, the interest of the juniors in the opportunities presented to them for advancing their professional knowledge appears to be accentuated much more in the Midlands and northward than southward. The reasons are clear. Gas-works cluster thickly round the vast industrial centres of the North and Midlands; and it is a comparatively easy matter to get together a number of prospective gas engineers and managers from the staffs of those works. Their opportunities are incomparably greater in this respect than those of their compeers down South.

These reflections were started by learning of the success that has attended the very inauguration of the gas manufacturing and distribution lectures at the Leeds University, about which lectures Professor W. A. Bone, the head of the Department of Gas Engineering and Fuel, communicated information to our readers on Dec. 8 last. The lectures on gas manufacture are in the hands of Dr. Harold G. Colman, and those on distribution have been confided to Mr. Walter Hole. A beginning was made by Dr. Colman last Wednesday; and his second lecture was delivered early the following morning—the idea being to enable students from a distance to take two lectures on one visit. In all, there were about 30 students present; and they covered territory as far north as Newcastle, as far south as Grantham, and on the east Scarborough, but there might be a stronger representation from the west. Naturally, the greater number of students were drawn from the district near Leeds; but there are a number who have taken advantage of the facility offered at one of the University residential halls, as already mentioned by Dr. Bone in his communication, of bed and evening and morning meals on very moderate terms. For a commencement, we regard the news as good, and look to receiving increasingly gratifying intelligence. Nothing, of course, can be said about the future. What the future holds in store in the matter of these lectures, the experiences of the present series of lectures will determine. These first thirty students have, therefore, a responsibility upon them in this matter; not only in respect of their constant attendance and interest, but by proving and making known the value of this particular opportunity for adding to their store of knowledge.

To Detect and Cure the Ills.

The electrical industry, like human beings of too rapid growth, has outrun its strength, and is now, and has been for some few years past, suffering from a complication of disorders. Such we gather to be the opinion of a number of estimable gentlemen who are proposing to attack the ills through an Electrical League. Not that there is any lack of organizations in the industry. It has its Institution of Electrical Engineers, the District Sections of the Institution, the Association of Municipal Engineers, and the Manufacturers and Contractors Associations. But there is complaint that the interests of these various bodies are so diversified, and in a measure so conflicting, that they are incapable of combined endeavour in all directions. The proposed Electrical League is intended to start as a neutral organization on all contentious matters; and it is proposed that all interested in the electrical industry, no matter their position—whether shareholders, consulting engineers, town councillors, manufacturers, contractors, traders, or otherwise—can obtain membership by the simple expedient of paying half-a-crown a year. If the scheme reaches a corporeal state, the heterogeneous interests will necessitate a continuance of neutrality on many vital questions; and the enforced passivity will no doubt in time terminate existence. There can be no effective cohesion in such a hybrid body. However, the intentions of the promoters are, like New Year's intentions, good in their way. They want to bring the varied interests on to one platform; and then set the united strength to work to first detect the causes of the misfortunes of the industry as a whole, and to follow up detection by seeking means of redress. It all moves us to sympathy.

The promoters direct attention to a terrible list of the industry's misfortunes and grievances. No one can question the great, beautiful, and valuable scientific advances in the electrical world; but the commercial reward, it is felt, has not been commensurate with those advances. We freely grant that in the beginning of the electricity supply industry, the applied legislation was in some respects of a restrictive order; but, on the other hand, it gave a great deal more liberty than the gas industry has ever been allowed on the commercial side. Then it is complained there has been a shortness of capital. If the financial returns of companies and municipalities are consulted, and compared with the volume of business done, the shortness is more fancied than real. The municipal electricity concerns of the country have a larger undischarged loan debt than the municipal gas undertakings, which have had heavy spendings of late years in modernizing and enlarging plant, and in the distribution department, owing to the popularity of the prepayment system and gas cooking and heating. But the profits of the gas undertakings, after meeting all obligations, bear a far different complexion from those of electricity supply. Consulting engineers and would-be station engineers lack employment. This too is attributed to the same shortness of capital. Is it not rather that the supply of engineers is in excess of the demand? Manufacturing and contracting profits are small. Is that not due to the manufacturers and contractors being in excess of requirement? The fact of the matter is that an early phenomenal growth brought into existence more professional men, more manufacturers, and more contractors than the slower rate of growth now can maintain. Shareholders in electricity supply companies are dissatisfied with their dividends, and ratepayers in numerous districts where there is municipal electricity supply are equally dissatisfied with their financial record. There need be no surprise at this, with the extraordinary conjuring there has been with electricity tariffs, resulting in largely diminished average profits per unit. Acts of Parliament can give a foundation to an industry, and put upon it a certain amount of control; but they cannot frame policy nor develop commercial instinct and sagacity.

Should the movement for a League mature, the organization will have some complex problems to tackle, if the opposing interests can bring themselves into harmony for the purpose. There is a desire, too, on the part of the League to enlist public pressure in forcing their remedial measures to a head; but public sympathy has been largely divorced from electricity interests by the extent of municipal blundering and prodigality in connection with electricity trading. As a matter of fact, neither the public nor Parliament can do much in this matter. The troubles from which the industry is suffering are internal; and within the industry must the remedial measures be found and applied. Certain it is that the industry cannot bear all the weight it is expected to carry to-day; and so long as the excessive burden continues, so long will commercial progress as reflected by financial success be, taking the industry as a whole, at a tediously slow pace.

Yet Another Promotion.

The prolificness of the gas promotions of 99, Cannon Street, suggests that the game is a paying one for the few, but a disastrous one for the many. Yet another promotion calls for notice this week—to wit, the "Beaufort Gaslight and Coke Company (1908),

Limited." The name of Sir Charles Buckworth-Herne Soame, Bart., appears as Chairman; and those of S. J. Acland, "M.I.G.E." and H. Russell, "M.I.M.E.," are associated with the Baronet as Directors. We are not here called upon to assess the relative money-attracting powers of the affixes "Bart.," "M.I.G.E.," and "M.I.M.E.;" but when it is found that the vendors of the Company are the Water-Works, Lighting, and Power Investment Corporation, Limited, of 99, Cannon Street, the necessity for a close scrutiny of the prospectus is at once forced upon us. It is proposed to start this Company with a capital of £12,000, divided between "7" per cent. preference shares and "12" per cent. ordinary shares. Those percentages are of the usual gross character of the temptation held out to investors from 99, Cannon Street. The present consumption of gas is not 5 million cubic feet per annum; so that, if the promoters succeed in getting £12,000 from the public, the concern will start with a capital equal to above £2400 per million cubic feet of output! Mr. Acland, "M.I.G.E.," and Mr. H. Russell, "M.I.M.E.," are both gas engineers; and their views on this grotesque capital would be of especial interest, as they would show the lines of defence of this group of company promoters for the extraordinary weight of capital under which they bury these little gas undertakings. According to the Consulting Engineer—S. J. Acland, "M.I.G.E."—no dividends were paid by the Beaufort Company on their then small capital from 1892 to 1905; the profits being devoted to capital expenditure. After relieving capital in this manner for something like thirteen or fourteen years, in 1907 the Company were able to pay only a 4 per cent. dividend. That was on a slender capital. What are the prospects of the 7 per cent. on the preference shares and 12 per cent. on the ordinary shares on a £12,000 capital?

Investigation of Prospects.

It will be interesting to find an answer to the question. The consumption of gas, we understand from the prospectus, is now 5 million cubic feet (4½ millions is the output mentioned in Mr. Acland's report). He also says that it has taken nine years for the consumption to increase by nearly 100 per cent. In this period therefore the increase has been less than 2½ million cubic feet. If this is to be the rate of increase in future—2½ millions every nine years—it will take upwards of 36 years to pick up the 10 million cubic feet that is to raise the consumption to 15 million cubic feet, at which point, with gas continued at the price of 5s. (!) per 1000 cubic feet, the estimated net profit available for dividend will be £1500 per annum. The amount required to pay the annual dividends on the £12,000 capital is £1140. All this presupposes that the price of gas can be maintained at 5s. per 1000 cubic feet, and that no capital beyond the £12,000 will be raised before the sale of 15 million cubic feet of gas is attained. This is clearly what the public are intended to assume, because the prospectus states that "this issue of shares will enable the output of gas to be increased from 5 millions to 15 millions." The Water-Works, Lighting, and Power Investment Corporation, Limited, if they continue to have a finger in this little pie, are not (speaking with ample precedent before us) the people to let things run slow in the matter of capital raising. What are the prospects of getting a consumption together of 15 millions? All the big consumers in the main part of the district proposed to be supplied have, it appears, already been captured; and their consumption is included in the present output of under 5 millions a year. There are three railway stations in the area—the largest one is already lighted by gas. In Beaufort, there are eleven churches and chapels and two schools—all lighted by gas. The district at present supplied contains 28 shops—all lighted by gas. There are 23 inns—all lighted by gas. These are in the main part of the district to be supplied; so that the largest outlets for business are already connected up. This being so, the justification is not apparent for Mr. Acland's roseate view that "there is a very considerable scope in the district at present supplied by the Company's mains, to say nothing of that portion of the area of supply not yet developed." But if small promises will give great joy—well, intending investors should go into raptures on learning that there are over 40 new houses in course of erection in the district, and that "appearances" (which are most elusive and unsubstantial things) point to extensive building and rebuilding operations in the near future.

Other Notable Features.

The first haul of the "vendors" is to be £4500, for the works and their profit, out of the £12,000 capital. The works, we understand, were going begging for a buyer at about £600 not a great while since. It is not clear whether the vendors' Construction Company are about to enter into contracts for the extension of the works and mainlaying, which has been part of the old game. They are selling the works at a profit; and they do not enter into plant contracts excepting at a further "profit"—quoted to emphasize it. Another point is that the Articles of Association provide that, "upon any offer of shares to the public for subscription, the Company may pay a commission at a rate of not exceeding 50 per cent. to any person on consideration of his subscribing for any shares of the Company." If there are many shares issued at this rate of commission, it will have rather a bad effect on the relations of the real and the nominal values of the capital. The tenancy of the office of Director, too, need not submit the occupant to much financial risk; for the holding of shares or stock of the nominal amount of £20 will cover his qualification. The Company have no parliamentary powers. It is a limited concern, operating in the district merely on sufferance. If there are any innocents abroad with loose cash, here is a chance for getting rid of it. That is the best we can say for the fresh promotion, notwithstanding that there is a Baronet on the Board, and that two of the Directors have appended at the ends of their names the title of "Gas Engineer."

Municipal Engineers in Conference.

One more has been added to the list of professional associations by the arrival of the Institution of Municipal Engineers, who held their first active business meeting in London on Saturday. As has already been stated in our pages, the objects with which the Institution has been established are the promotion and advancement of municipal engineering, and the maintenance of the interests of the profession. It was set forth that candidates for membership must have been trained as municipal engineers, and hold responsible engineering appointments to public authorities, or be engaged in such other manner as may, in the opinion of the Council, warrant them being put forward for membership. In order to make the organization an Institution of Municipal Engineers in the very widest sense, it was decided to admit as members men holding important appointments under local authorities, as electrical, gas, mechanical, and water engineers. This is in agreement with the comprehensive definition given to the term "municipal engineer" in his address by the President (Mr. J. T. Pegge), who said it included all engineers and surveyors employed by local governing authorities. Judging from what the President said on the subject, exclusiveness is emphatically not to be one of the characteristics of the new Institution; and as the field from which members may be culled is so large, a successful future should be before it. At Saturday's meeting four papers were submitted; and those which had been printed and circulated in advance were taken as read. In this way, much time was saved, which those present were able to devote to discussion of the matters dealt with. It will be seen that only one of the papers was of close interest to our readers; but in this some useful hints were given with regard to the lighting by gas of small urban districts. The author, Mr. E. F. Willson, is evidently a practical man, and what he had to say was the result of his experience. With reference to the discussion—at which Mr. Willson himself was not able to be present—a word of regret may be uttered that there was no gas man there to reply to some of the arguments advanced by Mr. Boot, who is an Electrical Engineer. In some respects, the members heard only one side of the matter; and an acquaintance with the other side would doubtless have been of at least equal interest to them. It is to be hoped that at future meetings, when questions of lighting and heating may be up for discussion, gas will not be left without some doughty representatives to champion its cause. It may be remarked that the Institution already numbers 436 members and 26 students.

Conduct of Ratepayers' Meetings.

There seems to be something that is not altogether satisfactory about the meeting of ratepayers which took place last week at Bradford. The Corporation had given notice of their intention to promote two Bills in the next session of Parliament—one having regard to gas, electricity, and water matters, and the other being a General Powers Bill, which contained provisions for the rating of unoccupied houses and buildings and vacant land. A storm of opposition was, however, aroused, which came

to a climax when the statutory gathering of ratepayers took place. As to the precise merits of the case against the measures, it is not our intention just now to inquire. Suffice it to say that at the meeting an overwhelming majority—said to have been representatives of the landlords and various trade and other associations—would have nothing of the Bills. They would not sift the wheat from the chaff (if any). Not a bit of it! All must go into the fire. Thus for the sake, perhaps, of a few clauses to which objection might fairly be taken by many of the ratepayers, the whole of the proposals were sacrificed. To so decide if they choose is one of the privileges belonging to ratepayers, who on such occasions have always the means of really making their power felt—or, at least, they should have. And this brings us to the thought which prompts these few lines—the pity of the suggestion which has been made that the first people to arrive at the Council Chamber (where the ratepayers' meeting was arranged to be held) were over 250 Corporation workmen, which left something under 70 seats available for officials and the general public. When the Lord Mayor reached the Chamber, finding a large crowd remained outside eager for admission, he very properly transferred the meeting to a larger hall; and there in due course the two Bills were negatived. On the following day, at a meeting of the City Council, a question was asked as to who had authorized the large attendance of Corporation workmen just referred to; but no one could answer it—the only statement made being that merely "the customary precaution had been observed." Now, it is impossible to deny the right of these workmen to be present as ratepayers, if they of their own free will desired it; but if they went it should have been in their individual capacity. If that was not the case on the present occasion, it is to be regretted that they should have attended at all; and we feel sure the Corporation will recognize this when next they are desirous of passing a Bill through Parliament.

London Streets Without Lamp Columns.

In a few hours from the time of writing, Fleet Street will be, except on the three refuges, absolutely divested of street-lamp posts. For a large arterial thoroughfare, we believe this will be absolutely unique in London. We know of one other thoroughfare—Sackville Street—that can boast of the same thing; but that is not such a wide thoroughfare as Fleet Street, nor can it claim the same importance. Cannon Street has its centrally suspended flame arc lamps; but the heavy old electric light standards still have place on the footways. In Fleet Street, it looks somewhat strange after the long reign of lamp columns, to see the footpaths completely destitute of them; and only having on the kerbs such things as pillar post-boxes, fire-alarms, ambulance boxes, and litter bins. But while all such things are obstructions, the footpath lamp-post of reasonable dimensions do offer to an extent some protection to the foot passengers, and though they have frequently come off second best in encounters with motor buses, they have assisted in keeping vehicles with sides bulging over the wheels or goods projecting beyond the sides of the vehicles well out in the roadway. Without lamp-posts, the tendency will be for drivers of such vehicles to monopolize a bit more of the footpaths when traffic is dense. The new high-pressure inverted burner gas-lamps now lighting Fleet Street are all, save in the cases of the three refuge lights, suspended from brackets. In the neighbourhood, advantage is already being taken of the high-pressure service by printing-houses in Bouverie Street.

A Splendid (?) Offer Indeed.

A correspondent sends a copy of a circular-letter he has received from a West of England firm wishful to do business with gas undertakings, but whose identity—for obvious reasons—it is not necessary to mention, so as to give them a free advertisement. The letter starts with certainly an equivocal statement, and one that may be open to very grave question, as suggesting an illicit consideration for orders received. The circular says: "We offer to *your absolute profit and advantage* [our italics], first-hand and shorn of all commission, middle, or fancy profits," &c., &c. After dilating on the superiority of the goods the firm have on sale, the letter concludes with this "special" paragraph: "A very handsome nickel hunting champagne knife (pocket), with combination corkscrew, cigar-cutter, file, nail-trimmer, &c., will be presented as a New Year's Souvenir, with each order. Extremely strong, attractive; will last a life time. Actual value, 5s. each." What type of individual, one is tempted to wonder, would be induced to place an order for goods so as to secure such a real prize as this souvenir "champagne knife" must be

Prevention of Corruption.

It was indicated last week, in a paragraph under the heading of "Pestering the Manufacturer," that, from information to hand, it is found that the practice of soliciting gifts in the gas industry has not yet completely died out; and possibly it will not do so until there has been an example made of someone. There has already been a fairly long list of convictions outside the gas industry; and the authorities are anything but idle in getting upon the tracks of hints received by them. To add to the series of convictions, is a sentence of six months' hard labour awarded, at the Central Criminal Court last week, to a man named Harris, for having offered a sum of money to a clerk in the office of a firm of solicitors as an inducement to him to do a certain act in relation to his principal's affairs and business. At Bow Street Police Court, too, a tradesman named Greene was fined £5 and £10 10s. costs for offering certain gifts to a porter at the Hotel Cecil. It matters not what the details of these cases are; the lessons apply to all businesses, and all engaged in business, whatever their position—whether master, officer, or servant of lower rank. It is a moral certainty that when Harris has finished his six months' hard labour, and now that Greene has paid away £15 10s., they will hesitate to repeat the offences that have brought them within reach of both the arm of the law and the punishment they have courted by wittingly defying the Prevention of Corruption Act.

The Proposed Gas and Electricity Tax in Germany Condemned.—According to the Berlin Correspondent of "The Times," the German Handelstag (a representative body of German industrialists), who have lately been discussing impending social legislation, last Tuesday completed their review of the Imperial Government's finance reform scheme by unanimously condemning the proposed tax on gas and electricity.

Density of Methane and the Atomic Weight of Carbon.—This was the subject of a recent communication to the Paris Academy of Sciences by MM. Baume and Perrot. The gas was prepared by the action of water on methyl-magnesium iodide, and after washing was purified by fractional distillation under reduced pressure. Air being appreciably soluble in liquid methane, special precautions were necessary to remove this impurity. The mean weight of the normal litre of methane was found to be 0·7168 gramme. According to the method of reduction employed, the atomic weight of carbon from this density is deduced as 12·004 (Leduc), 12·005 (D. Berthelot), and 12·003 (P. A. Guye).

Making Connections to High-Pressure Steel Gas-Mains.—The Gaslight and Coke Company have commenced the laying of high-pressure steel tubes off the Fleet Street main which was put down recently for the purpose of supplying the new inverted lamps in that thoroughfare. As was anticipated, a call has been made on this main for industrial purposes in the great printing area, for the purpose of type-melting. A beginning has been made in Bouverie Street, to the "Punch" office. The main is a 6-inch Mannesmann steel tube; but owing to it being slightly under ¼ inch in thickness, there is no room for a good thread for the branch service. They are therefore strengthened with a 3-inch collar, made of ¾-inch wrought-iron, flanged together in the centre. On the top is a further ½-inch connecting piece. The whole are threaded; and the service pipe goes well through all into the main.

Absorption of Water by Coke.—A series of researches on the power of red-hot coke to absorb water are detailed in a recent issue of "Stahl und Eisen," and the results are set forth in graphic diagrams; the amount of the water again given off at various intervals of time being also shown. According to an abstract of the article in the Engineering Supplement to "The Times," it would appear from the results of these tests, which were conducted with small quantities of coke (1 kilo.), that red-hot coke plunged into cold water will absorb from three to four times the volume of water as compared with the quantity which it will take up if it is placed in hot water when it is cold. The results of ten experiments are also recorded in which freshly-drawn red-hot coke, in quantities of about 100 kilos. at a time, was immersed in cold water, and allowed to remain therein for half-an-hour. It was then withdrawn and placed in casks with perforated bottoms, out of which the water was allowed to drip for an hour. Subsequently the weight of the coke was ascertained at intervals of 24, 48, and 72 hours—that is to say, the gradual evolution of water was ascertained. Ultimately the whole of the coke was stamped to powder and carefully dried, so as to ascertain the weight of the coke alone. The test proves that slightly damped coke will give off water in a railway waggon at the same rate as that which has been more drenched. Samples of foundry and blast-furnace coke were tested.

THE LIVESEY MEMORIAL FUND.

We have received from Mr. Walter T. Dunn, the following list of further contributions to the above-named fund:—

1909.		£	s.	d.
Jan. 11	Amounts already acknowledged	1321	13	6
„ 12	Carless, Capel, and Leonard, Hackney Wick	10	10	0
	Robert Bruce Fitzmaurice, London	1	1	0
	Albert Gray, K.C., London	3	3	0
	S. Davis Nicholls, Limited, London	1	1	0
	Laurence Rostron, Beddington	10	10	0
	Sheffield United Gaslight Company	200	0	0
	S. Y. Shoubridge, Lower Sydenham	10	10	0
	Samuel Wood, London	2	2	0
„ 13	F. F. Farrand, Ryde	1	1	0
	William Maltster, Lower Sydenham	2	2	0
	Ryde Gaslight Company	5	5	0
	Wandsworth and Putney Gaslight and Coke Company	105	0	0
	Wellingborough Gaslight Company	10	10	0
„ 14	William Belton, Shrewsbury	2	2	0
	Danish Gas Company, London (further contribution)	15	15	0
	Davenport-Hill (Miss), Oxford	2	2	0
	Arthur Lucas (Deputy Chairman of the Imperial Continental Gas Association), London	1	1	0
	A. F. Phillips, Westminster	10	10	0
	John Terry and Co., London	5	5	0
	Joseph Tysoe, East Greenwich	5	5	0
	Warwick Gaslight Company	5	0	0
	John Young, Hull	5	5	0
„ 15	Brecon Gas Company	2	2	0
	Gosport Gas and Coke Company	5	5	0
	Hampton Court Gas Company	21	0	0
	Kenilworth Gas Company	2	2	0
	Maidstone Gas Company	10	0	0
	Henry Puplett, Westminster	1	1	0
	E. C. Riley, Swindon	1	1	0
	Spencer Chapman and Messel, London	10	10	0
„ 16	James Lowe, Plymouth	2	2	0
	Robert Morton, Deputy Chairman, South Metropolitan Gas Company	52	10	0
	Charles M. Ohren, Lower Sydenham	5	5	0
	Julius Norden, Limited, London	1	1	0
	Plymouth and Stonehouse Gaslight and Coke Company	100	0	0
	Hanbury Thomas, Managing Director, Sheffield United Gaslight Company	21	0	0
	Walton-on-Thames and Weybridge Gas Company	10	10	0
	Alexander Wilson, Glasgow	10	10	0
	Henry Woodall, Westminster	21	0	0
„ 18	Alfred Colson, Leicester	5	5	0
	J. Irminger, Copenhagen	2	2	0
	Friedrich Lux, Ludwigshafen	5	5	0
	Newark Gas Company	5	5	0
	Stoke-upon-Trent Gas Committee	2	2	0
	Total	£2033	11	6

THE RUIN OF MESSINA.

A Fund for the Assistance of the Homeless Gas-Workers.

THE position of the gas workers of Messina is not so deplorable as many of the poor of Messina who are dependent for the relief of their immediate necessities upon charitable sympathizers, who may be to them total strangers. But the condition of a considerable number of them and of their wives and families is such as to claim both sympathetic and material consideration. In the catastrophe, many of the men and their families lost not only the means of subsistence, but their homes (which they have toiled so long to establish and maintain), together with their clothing. Some 80 out of 200 men have so far reported themselves; and for these the Union des Gaz have kindly provisionally provided employment at Milan and Genoa. Temporary shelter was found for them at the gas-works; and their families were taken care of by the Local Relief Committees. But there is the personal loss of so much that was cherished, so much that went to make up the homes, and so much that had been laboriously got together. Remembering this, a lady shareholder of the Continental Union Gas Company made the suggestion that the Directors should start a small fund among friends and sympathizers, to provide, at any rate, proper clothing for the unfortunate victims—the men, the women, and the children. The fund has been started, and to date it amounts to nearly £200.

The following are the present subscribers:—

	£	s.	d.
Directors	46	15	0
Office Staff	7	3	6
Imperial Continental Gas Association	50	0	0
European Gas Company	25	0	0
"A Proprietor"	20	0	0
Ponta Mousson Foundries, through their London agents (Messrs. Fenestre and Cadick)	20	0	0
H. A. Brightman and Co.	10	0	0
B. F. Harris	5	5	0
Miss K. Fielden	5	0	0
Mrs. H. John	2	0	0
Mr. Charles Hunt.	2	0	0
W. H. Green	1	1	0
R. B. Fitzmaurice.		10	6

Regarding the latest returns as to the staff. It consisted of 32 members. The Manager, Cashier, Storekeeper, and two Clerks are reported dead. Of five members nothing has been heard; but some 22 are known to have escaped.

PERSONAL.

Mr. LEES BUCKLEY has been appointed Secretary and Collector for the Ashton-under-Lyne, Stalybridge, and Dukinfield District Joint Water Board, in succession to Mr. R. H. Rothwell.

Alderman LEONARD WILD has resigned the chairmanship of the Gas Committee of the Bolton Corporation, mainly on account of his advanced age; and Mr. W. WEBSTER will occupy the position for the remainder of the current year.

Mr. E. H. ELLIOTT, of Rochester, has been appointed to succeed the late Mr. J. J. Foord, J.P., on the Board of the Rochester, Chatham, and Gillingham Gas Company, and also on that of the Brompton, Chatham, &c., Water-Works Company.

In the presence of a large attendance of employees last Tuesday, two presentations were made at the Devonport Gas-Works—a marble clock and a silver cigarette-case (with suitable inscriptions) to Mr. W. H. OWEN, the General Foreman, who is leaving to take up a similar position at the Hornsey Gas-Works, under Mr. J. W. Buckley, his former chief. Mr. H. Clarke (Superintendent) presided, and said that, while they heartily congratulated Mr. Owen upon receiving an important appointment at Hornsey, they were exceedingly sorry to lose him. He had known Mr. Owen probably longer than anyone present, as they had both held similar positions at the Luton Gas-Works; and he had always found him a real and trustworthy friend. He admired his zeal for work and his abilities. Mr. J. Jennings (Storekeeper), in presenting the timepiece, endorsed Mr. Clarke's remarks, and said Mr. Owen always studied the best interests of workmen and employers. He wished him success in his new position. The Chairman, in asking the new Engineer (Mr. W. P. Tervet) for a few words in support, called for three cheers of real welcome to him, which were heartily responded to. Mr. Tervet spoke in the highest terms of appreciation of Mr. Owen's abilities; and Mr. Owen replied. Mr. F. Westlake (the Treasurer) then, on behalf of the Bowling Club, presented the cigarette-case as a mark of the appreciation of the valuable services Mr. Owen had rendered to the Club.

Large Gas Collier in the Upper Thames.

A few days ago, there arrived at her mooring opposite the works of the Wandsworth and Putney Gas Company the largest steamer which had ever come so far up the river. The vessel belongs to the Company; and an idea of her size may be formed from the fact that she contained upwards of 1200 tons of coal. She nevertheless arrived at her destination two hours before high water, owing to her great length, shallow draught, and high speed. The last is a necessity for this boat, as she must be at Wandsworth by the time other vessels reach the unloading places at Charlton; and it is claimed for her that she is the fastest collier afloat. Special features of the vessel are that the engines are all aft. This facilitates unloading, by reason of there being no tunnel through either of the holds. The hatches are enormously large, allowing plenty of scope for the unloading machinery, which consists of grabs taking "bites" of 30 cwt. of coal at a time. This plant is of such power that the vessel is entirely cleared in from eight to nine hours. Another unique feature about the vessel is the fact that the officers and crew, numbering 17, are all teetotallers. They are very well cared for in the matter of accommodation; and the officers are, for a collier, most comfortably located. The idea of steamers running up the river as far as Wandsworth originated with the Chairman of the Company, Mr. H. E. Jones; and the vessel constructed to carry it out was designed by Mr. Robert Eeles, M.I.N.A., of Newcastle-on-Tyne, who was able to incorporate several new and improved details in regard to the facilities of unloading made by their Engineer, Mr. H. O. Carr.

OBITUARY.

The death occurred recently, at his residence in Brussels, of M. RUMMENS, whose name will probably be remembered by some of our readers in connection with his arrangement of vertical retorts for the production of coal gas and water gas.

The death took place last Thursday, with great suddenness, of Alderman THOMAS GOLDSWORTHY, J.P., of Newport. He had been in failing health for some time, but latterly appeared to be better; and when he attended the monthly meeting of the Corporation on Tuesday last, he was congratulated on his improved appearance. Deceased, in his business as a contractor, had carried out many important works, including water schemes in Monmouthshire and the adjacent counties. His public life was an active one; and at the time of his death he was Chairman of the Newport Water Committee. In fact, his last speech at Tuesday's meeting of the Corporation was in defence of the water-works. He was 64 years of age.

The death has occurred lately at Sunderland, in his 77th year, of Mr. ROBERT HODGSON, who for nearly 36 years had been connected with the Sunderland and South Shields Water Company, for which he had been outdoor Manager some twenty years. He was a native of Hurworth, near Darlington, and went to Sunderland as clerk of the works on the erection of the offices of the Gas Company. In February, 1873, he was appointed by the Water Company to superintend the construction of the Humbledon Hill reservoir, and later for building the Dalton-le-Dale Water-Works. During his connection with the undertaking, six new stations were put up, and the Company almost doubled their operations. Deceased had been unwell for eighteen months, owing to a general breakdown in his health.

By the recent death, at the advanced age of 89, of Mr. GEORGE SMEDLEY at Buxton, in which town he for some years filled the position of Gas Manager, another of the old associates with the gas industry has been removed. Mr. Smedley was not originally intended for the gas profession; but, his father having acquired, with others, the lease of the Sleaford Gas-Works, he obtained sufficient technical knowledge to enable him to undertake their management. In this he was most successful. He subsequently removed to Middleton to discharge similar duties; and after three years' service he obtained the position at Buxton, which he filled for 33 years. When he entered upon his duties, the works were in the hands of a Company; but they were transferred to the Local Board, and Mr. Smedley's services as Engineer and Manager were retained. Subsequently, new works were constructed by him. He retired in 1900, and was appointed Consulting Engineer; the active management being entrusted to Mr. Harold Barker. Mr. Smedley joined the British Association of Gas Managers in 1866, and was a member of the Gas Institute and the two Institutions. He was a member of the Manchester District Institution of Gas Engineers, of which he was President in 1895, in which year the August meeting was held at Buxton. Deceased held a high position as a Freemason. He has a son in the profession—Mr. G. B. Smedley, the Manager of the Swadlincote Gas-Works.

Funeral of Lady Livesey.

The funeral of Lady Livesey took place at Nunhead Cemetery last Thursday, in the presence of a large number of mourners. The interment was in the grave in which Sir George Livesey was buried. The chief mourners were Mr. Frank, Mr. George, and the Misses Livesey (nephews and nieces of Sir George), Mr. and Mrs. Kiddle, and four nephews of Lady Livesey. Among those who were at the cemetery were Mr. Charles Carpenter (Chairman), and Mr. Robert Morton (Deputy-Chairman) of the South Metropolitan Gas Company; Mr. Frank Bush (one of Sir George's Executors, a Director and late Secretary of the South Metropolitan Gas Company), Mr. S. Y. Shoubridge and Mr. Charles M. Ohren (Engineer and Secretary respectively of the South Suburban Gas Company); Mr. H. E. Jones (a Director and late Engineer of the Commercial Gas Company); Mr. Henry Austin and Mr. C. Drumgold (two of the Workmen Directors of the South Metropolitan Company); and Mr. W. G. Waller (one of the Workmen Directors of the South Suburban Gas Company). The officiating clergy were Archdeacon Hodges and Canon Hodges. There were a large number of floral tributes from the members of the family, and a great gathering of the gas-workers' wives was present at the graveside.

Mr. W. H. Johns, who has recently been appointed Works Superintendent at the Saltley works of the Birmingham Corporation, was the recipient, on Thursday, the 7th inst., of a handsome aneroid barometer from the officials of the Bath Gaslight and Coke Company, as a token of their esteem. The presentation was made by Mr. H. Shepherd, the Secretary of the Company, at the annual dinner of the staff, who voiced the feelings of all present by wishing Mr. Johns every success in his new sphere of work. On the following day, he was presented with a tantalus from the workmen, and a case of pipes from the students attending the classes in gas manufacture and supply held at the Bath City Technical Schools, where Mr. Johns acted as lecturer.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 197.)

THE Stock Exchange has had a quiet week so far as the volume of business done is concerned, partly owing to its being account week, and partly owing to two events foreseen as impending and now realized as actualities—viz., the rise in the Bank rate, and the issue of the Russian Loan. But in point of tone, a very cheering note was struck by the Austrian settlement with Turkey. Some promise of this happy incident was afforded on the opening day, and markets were brighter, though the advanced hardening of money repressed activity. The markets experienced much relief on Tuesday by the welcome political intelligence; and prices responded to the cheerful influence. But there was not much further rise on Wednesday; for with the settlement on hand and with tight money, there was little disposition for new business. Thursday was a quiet day, and markets seemed apathetic even when the Bank rate was advanced—the rise having been practically discounted. On Friday, things in general were dull and quiet, in an expectant attitude; Consols and some of the gilt-edged showing weakness. On Saturday, the Russian Loan was launched, and aroused activity in the Foreign Market. Other markets were a little more animated also, and the general tone was firm. In the Money Market, the continuous hardening culminated on Thursday, in a rise (unusual in January) in the Bank rate to 3 per cent., from the 2½ per cent. rate which had lasted since May 26, 1908. Business in the Gas Market was scarcely as abundant as the preceding week; but the bright tendency continued unabated, and advances in price proceeded merrily. In this connection, Gaslight and Coke ordinary was noticeable with a gain of another point; a large stride upwards was made by Liverpools; and Continental Union effected a further recovery from its depression. Dealings in Gaslight ordinary were marked at 101 on the opening day; and 102½ was reached before the close. In the secured issues, the maximum was done at 89¾ and 90¼, the preference at 106¾, and the debenture at 84½. South Metropolitan was quiet and firm, changing hands at from 101¼ to 102¼—a rise of ¼. Nothing at all was done in Commercials. In the Suburban and Provincial group, Alliance and Dublin old marked 18½, Brighton original 216, ditto ordinary 156, Lea Bridge 121½ and 122, South Suburban 118½ special, and West Ham from 112 to 113. In the Continental companies, Imperial was unchanged at from 179 to 180¾, Union was done at from 100 to 102½ (a rise of 2), and European fully-paid marked from 24 7/16 to 24¼. Tuscan was done at 8¾—a fall of ¼. Among the undertakings of the remoter world, Buenos Ayres changed hands at 11 13/16 and 11⅞, Monte Video at 11 13/16 and 11 15/16, Primitiva at 5 15/16, ditto preference at from 5 3/16 to 5 11/32, ditto debenture at from 96½ to 96⅝, River Plate at from 13⅜ to 13 5/16, and San Paulo at 14⅛.

ELECTRICITY SUPPLY MEMORANDA.

Degenerate Wiring and Fires—Mr. Castle Russell Defends his Attitude—Our Question and the Reply—A Testimonial for Gas Installation Work—Condemnation of Flexibles—Fire Offices and Installation Efficiency—Fatality at 220 Volts.

THE warning by the Chief Electrical Engineer of the Phœnix Insurance Company (Mr. S. G. Castle Russell, M.Inst.E.E.) respecting the danger from fire of cheap installations of electric lighting, to enable electricity to better compete with gas lighting, has caused an amount of perturbation among those of the electricity industry who count a present temporary success of more value than future degradation of name. Let us recall what was perhaps the most important statement in Mr. Russell's original communication to a representative of the "Electrical Contractor," which was commented upon in the "Memoranda" for the 15th ult. "I would state definitely," he said, "that not one-half of the electrically caused fires in this country are reported in the daily newspapers. Contrary to what appears to be a general impression, electrical fires are not reported in the papers. Why here I have a list of fifty electrical fires which have taken place, in this country, since Jan. 1 this year [1908] in a single area under one authority. . . . To talk of the 'absolute safety' of electricity is—well, hardly correct. And all this in face of the good standard of wiring in this country." One or two of the electrical papers that are giving support to the agitation on the part of a section of electrical engineers for a cheaper and lower standard class of work in electrical installation, and the free use of flexible surface wiring, have had a few ineffectual tilts at Mr. Russell's disclosure; but, in the time to come, they may have cause to bless rather than censure him for the stand he is now making against the depreciatory tactics of the business-at-any-price party. In one quarter, it is said that the idea is to limit the lower standard installation work to (say) the six-light man. It is an indurated electrical notion that anything is good enough for the working man—from the illuminating power of rush-lights to an ever-present danger. The "Electrical Review"—with a wise solicitude for the maintenance of such reputation as the electrical industry has for safety, instead of sinking it to the level of Germany and America, by accepting what the electrical industries of those countries in

their dire experience are now discarding—has strongly opposed the resurrected favouring of cheap wiring. There was no better quarter, therefore, than the pages of our contemporary for Mr. Castle Russell to, from his experienced point of view as to what has occured in connection with the fire-raising proclivity of electricity during the era (which it is hoped has not yet closed) of high standard installation work, supplement what he has previously had to say upon the subject of the proposed degeneracy. But through the four-and-a-half columns to which his deprecatory article extends, there are not six sentences in it that can have so much weight as the categorical statement quoted above.

There is one matter in Mr. Russell's article that concerns ourselves. In the "Memoranda" for the 15th ult., the inquiry was put, "Why do the Phœnix Insurance Company require an Electrical Engineer?" And these sentences immediately followed: "The use of the word 'Chief' suggests, too, that a few other electrical engineers are in the same service. Gas is used to a far greater extent in London than electricity; but we have not the pleasure of knowing any Phœnix official who pursues his professional career under the title of Chief Gas Engineer." Now Mr. Russell has hardly done us justice in his comment on this point. He ignores the question as to why the Phœnix Company requires an "Electrical Engineer"—and a "Chief" one to boot. [Only one meaning intended.] What Mr. Russell says is that the "JOURNAL" put the query "Where is the Phœnix Gas Engineer?" "Your contemporary," he adds, "is assuming too much; all the Fire Offices have competent gas inspectors among their staffs of surveyors, who frequently make requirements directed towards the prevention of fires." It will be seen that there was no inquiry on our part as to "Where is the Phœnix Gas Engineer?" But merely the statement that we had not the pleasure of knowing any such official in connection with the Company. How Mr. Russell can twist our real inquiry into an assertion that we "are assuming too much," he is the best one to explain. What he does say is not a reply to our question. Surely, he does not place "competent gas inspectors" on an equality with a "Chief Electrical Engineer," and a "M.Inst.E.E."! If he does, well so much the worse for the dignity of the electrical engineering profession. Our point is that the Phœnix Company have not seen any occasion to appoint anyone for gas installations of a professional standing in line with that of their "Chief Electrical Engineer." On Mr. Russell's own admission, the Phœnix have not such an official, so that the matter can pass.

But we go on to read that the work of the "competent gas inspectors" has been simplified by the adoption of a standard and substantial system of installation, notwithstanding attempts from time to time to introduce inferior types of piping. Rules for the gas industry have always been in evidence. As to the rules, we have met with the simple requirements of the fire offices—gas piping and fitting work lending itself to simple requirements—in connection with factories and other large buildings. But the better installation work in the gas industry has largely been of internal growth, and not due to any external pressure. Many Gas Acts now contain powers granting inspection of gas-piping and the making of bye-laws in connection with the piping of dwelling-houses and other buildings; numerous gas engineers have set their faces against the use of compo. pipe; india-rubber connections are condemned; and gas authorities are doing their best to exterminate those relics of a bygone age, water-slide chandeliers. Mr. Russell, in conjunction with his statement that "rules for the gas industry have always been in evidence," states that "strict regulations have recently been drawn up to meet the new conditions of lighting—such as petrol gas, acetylene, &c." But petrol gas, acetylene, &c., have nothing much to do with us. They are family connections, in rivalry with the old-established house, but chiefly operating in territory still unexploited by the latter. In regard to them, however, Mr. Russell—and he ought to know—asserts that petrol-gas plants are more economical than, and quite as efficient as, electric light plants, but have not as yet the same advantages of convenience and security. But there are many keen minds engaged on the elimination of these defects.

The burden of Mr. Russell's article, however, is that the lowering of the standard of installation will inevitably bring in its train evil for the electrical industry. It is the ultimate big result in alarm and abandonment of custom, and not the present comparatively slight expansion of revenue, that the managers of the electricity industry have to consider in discussing the revival of the question of a lower standard. The submission of initial saving on the part of users will not stand critical inspection. It can at best be only a temporary saving. To guard against fires, frequent inspection and renewal of the proposed surface flexible will be required. We all know that Dr. Waldo, the City Coroner, is convinced that electric lighting is responsible for a greater number of fires than is even now attributed to it; and not very long ago the Corporation of the City of London issued circulars to electricity consumers, warning them of the necessity of overhauling their installations, and pointing out the danger of fire. In his experience, Mr. Russell has also discovered the need for inspection and renewals; and in connection with certain institutions he has had no difficulty in inducing the tenants to renew flexibles when necessary, "as there are *so many convincing instances of burn-outs*." The use of flexible cord in shops "is a source of constant anxiety to the insurance companies, and claims for fire damage to gloves, handkerchiefs, and similar articles are not uncommon." Further as to the fire-risk of the increased use of surface flexibles, workmen of less skill than those at present employed will undertake the work of installation; and the amateur will find it a convenient system on which to try his hand at extension work. Mr. Russell has found flexible used in roofs, under floors, carpets, and wall-paper, and in other unsuitable positions, where it is a source of danger. It is often twisted round gas-pipes; and, in consequence, "there have been numerous instances of gas explosions caused by the failure of the flexible." Flexible cord is, Mr. Russell emphatically says, at the present moment far too largely used from a safety point of view; and while he does not wish to pose as an alarmist, he feels strongly that the adoption of wiring methods here which have been discarded as unsafe in other countries will have a very bad result. However, if the caution goes unheeded, a few fires will soon knock out the present approval of some electrical engineers to the common adoption of flexible; but we fear there will be many more fires than there are at present that will be labelled "Cause of origin unknown."

This, however, is clear, that between a lower standard of electrical installation and the public, the Fire Offices intend to firmly stand. The interests of the public and the fire insurance companies are mutual, owing to the fact that fire is disastrous to both. In the case of the assured, fire means loss of business, and personal inconvenience and anxiety; to the fire insurance companies financial loss, with frequently the necessity for increased rates of premium. Cheap (and possibly nasty) installations, Mr. Russell urges, will mean an added fire risk. From his remarks in this connection, it is clear that the public are learning more as to the innate danger of electrical installations; and that more frequently than ever now, the users of electricity insist upon a fire office inspection of their wiring and fittings. "Should a fire happen after such an inspection has been made, then the office will hear of it, and very much to its detriment. I have known of *many* instances of insurances being removed from a particular office because an inefficient inspection has been made." This too, is a cogent statement, coming from Mr. Russell, that is worth consideration: "The original feeling that electric light wiring would standardize itself, as in the case of gas lighting, and inspections become unnecessary, has never been realized; and no surprise can be expressed in view of the fires caused by defective wiring, and the many attempts to introduce flimsy and insecure systems of installation." From all of which the impression is gained that the sense of the insecurity of electrical installations is strong among those responsible for the conduct of the business of fire insurance. Even the Workmen's Compensation Acts have added to the burdens of the Fire Offices in connection with electrical equipment. "The inspector," we read, "has now to consider the bearing of an insecure installation from the point of view of danger to life; thus increasing his responsibilities, and that of his office, as regards electrical installations."

This point brings us to the fresh illustration that was afforded, at the West London Coroner's Court, yesterday week, as to the danger of the very common 200-250 voltages at which electricity is now distributed. A labourer, named Reader, was engaged in painting the inside of a boiler, at the Lot's Road (Chelsea) generating-station on the 28th ult.; and in the boiler he met with his death. It was suggested that the fumes of the paint he was using might have overcome him, and caused him to fall on an electric hand lamp, connected with a lead, that he was using. The suggestion as to the fumes was disproved; and there was no doubt in the jury's mind that death was due to electric shock. The voltage of the current to the lamp was 220 volts; and two medical men agreed that death was due to electrical shock. The lamp the man was using has been examined by Mr. G. Scott Ram, His Majesty's Inspector of Factories; and he describes it as not being better and not worse than the majority of such lamps. At the inquest, he stated that there have been fatalities before through their use; and that he has frequently had occasion to mention the matter in his reports. He has known of 22 cases of death from electric shock at 250 volts and less. What with fires, failures, and fatalities, the advertising literature of electric lighting stations stands in need of very serious revision.

At the meeting of the British Association at Winnipeg in August, Professor H. E. Armstrong and Sir William H. White, K.C.B., will be the Presidents of the Chemistry and Engineering Sections.

Mr. W. N. Blair, M.Inst.C.E., the Borough Engineer and Surveyor of St. Pancras, has been elected President of the Incorporated Association of Municipal and County Engineers, who hold their annual meeting in London from the 24th to the 26th inst.

The Chairman of the London County Council (Mr. R. A. Robinson) has received a cheque for £273 15s. from the Gaslight and Coke Company towards the voluntary fund for the feeding of necessitous school children. The Company have contributed altogether £300 to the fund.

The scheme for the amalgamation of the London Institution with the Royal Society of Arts has been revived; and it has been sanctioned by the proprietors of the former body by a majority of 390. A special general meeting of the proprietors is to be summoned, at which the proposals of the Board of Management will be submitted for approval. This will probably be followed by a formal ballot of the proprietors; and if this should be favourable, the Board will then be in a position to discuss with the Society a scheme of amalgamation on the lines of that which was formulated, but not proceeded with, in 1905.

GAS BILLS FOR 1909.

THIRD ARTICLE.

THE review of the special provisions appearing in the Bills promoted by Statutory Gas Companies is continued to-day.

The Bill of the Heckmondwike Gas Company is principally a capital and extension measure. The present share capital is £63,000, divided into 1400 "A" shares of £5 each entitled to a maximum dividend of 10 per cent. per annum, 700 "B" £5 shares entitled to a maximum dividend of 4 per cent., and 2100 "C" £5 shares entitled to a maximum dividend of 7½ per cent. (all of which shares are fully paid up), and 4200 "D" £10 shares (in respect of which £9 have been paid up), entitled to a dividend at the rate of 7 per cent. The Company have borrowed £13,500. It is proposed that the existing capital shall be converted and consolidated into one class of stock on a 5 per cent. basis—giving to the holders of "A" shares £10 of stock, "B" shares £4 of stock, "C" shares £7 10s. of stock, and for every "D" share (if and when the remaining £1 has been paid up) £14 of stock. Provision is made for the creation of the necessary stock; but the conversion is not to have the effect of increasing the maximum reserve fund prescribed by section 31 of the Gas-Works Clauses Act, 1847. The Company ask to be empowered to raise £60,000 of additional capital; and the new auction clause is to be adopted. As to borrowing powers, the right is desired to borrow (inclusive of the £13,500 already borrowed) the sum of £21,000, together with one-third on the raised additional capital. While on the question of capital, a particularly interesting clause of this Bill may be quoted:

Notwithstanding anything contained in section 10 of the Companies' Clauses Consolidation Act, 1845, the Directors of the Company may refuse to permit any shareholder to peruse the list of shareholders, or to be supplied with a copy thereof in any case where the Directors have reason to apprehend that such perusal and such copy are not required by any such shareholder for *bonâ fide* purposes, and in his own interest as a shareholder in the Company.

Power is taken to create a special purposes fund and a reserve fund. A standard price of gas is suggested of 3s. 3d. per 1000 cubic feet, subject to the ordinary application of the sliding-scale to a 5 per cent. stock. But "any sum received by the Company in respect of gas supplied for power purposes under the provisions of this Act, in so far as the same is below the standard price, shall not be taken into account for the purposes of this section." The standard illuminating quality of gas proposed is 14 candles, tested by the "Metropolitan" No. 2 burner. Clauses are incorporated, authorizing the supply of "power" gas, on the usual lines. The Company desire to change their name to the Heckmondwike and Liversedge Gas Company. In regard to miscellaneous matters, the promoters are taking advantage of the extension now permitted of section 13 of the Gas-Works Clauses Act, 1847, which gives regulated liberty in the matter of differential prices. Additional lands are proposed to be taken for manufacturing purposes. The promoters and the Mirfield Gas Company are both empowered to supply gas within the ecclesiastical parish of All Saints, Roberttown, in the urban district of Liversedge; and it has been agreed between them that the right of the Mirfield Gas Company to supply gas there shall cease, and that the mains and plant of the Company shall be acquired by the promoters. Provision is duly made for this in the Bill; the agreed price being £2407 10s. Powers are asked regarding the construction of new footpaths as well as the stopping of old ones. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

It is not an extensive Bill that the Leyland and Farington Gas Company are promoting; being chiefly for capital purposes and for authorizing the supply of "power" gas. The Company were in Parliament as recently as 1902, when they obtained capital sanction to the amount of £64,800, of which £37,800 of ordinary stock, entitled to a maximum dividend of 5 per cent., has been issued and fully paid up, as well as £2000 of 5 per cent. preference stock. No part of the £10,000 borrowing powers has yet been exercised. The Company are now proposing to abbreviate their title to the "Leyland Gas Company." In the limits of supply, it is desired to include the parishes of Eccleston and Heskin. The Company wish for additional capital powers not exceeding £5000, and the application of the new auction clause, with one-fourth borrowing powers. The new special purposes fund is incorporated, with the limitation of the carry-forward to an amount equal to a year's dividend. Power is also taken to create a reserve fund. The standard rate of dividend is placed at 5 per cent., and the standard price at 4s. per 1000 cubic feet; the sliding-scale to operate half-yearly on the usual terms for 5 per cent. capital. The proposal is made that the standard illuminating power of the gas shall be 14 candles, tested by the "Metropolitan" No. 2 burner, with the Harcourt 10-candle pentane lamp as the standard. Authority is requested to the supply of "producer gas commonly known as Mond gas, and any development of Mond gas approved by the Board of Trade, for the purposes of motive or other power, heating, or other purpose to which such gas can be applied, excepting illumination. The provisions now commonly applied to "power gas" are incorporated. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

The Bill of the Pontypool Gas and Water Company is principally a water measure; and the major part of the provisions will therefore be noticed later. Mingled with the clauses, however, are found a few relating specially to the gas undertaking. It is proposed that the standard illuminating power of the gas shall now be 14 candles, tested by the "Metropolitan" No. 2 burner and the Harcourt 10-candle pentane lamp. Sanction is required to the purchase of additional lands for gas-manufacturing purposes. The old 10 and 15 per cent. discounts clause is proposed. The prepayment meter clause is adopted (as, although unmentioned in our notices, is the case in most of the other Bills), with the excess of 10d. for meter and fittings and 1s. if including cooking-stove, as in the model clause. But there is a variation where no fittings are supplied with the prepayment meter. In such case, instead of the usual 10 per cent. or not infrequently 6d. excess, the Company ask for 7d. extra. Of the additional capital powers (£75,000) asked for, the sum of £10,000 is to be allocated to the purposes of the gas undertaking. On such part as is issued as ordinary capital, it is intended to limit the dividend to 7 per cent.; and on such part as is issued as preference, 6 per cent. The new auction clause stands in the Bill. The proposed power to borrow is placed at the now ordinary one-third. [*Parliamentary Agents: Messrs. Rees & Freres.*]

The Bill of the Wells Gas Company is mainly a financial one. The ordinary capital authorized by the Company's Act of 1867 is £9000 in ordinary shares, as follows: £4000 in £25 shares entitled to a maximum dividend of 10 per cent., and £5000 in 400 £10 shares and 200 £5 shares entitled to a maximum dividend of 7 per cent. The 5 per cent. preference capital amounts to £5000; and the Company have borrowed £3300 on mortgage. The promoters ask for the conversion and consolidation of the preference and ordinary capital on a 5 per cent. basis; the preference shareholders to get nominal value in consolidated preference stock, the £25 ordinary shares £50 of ordinary stock per share, the £10 ordinary shares £14 of stock, and the £5 ordinary shares £7 of stock. The additional capital power requested is £15,000, to be issued under the new auction clause. Regarding borrowing authorization, the Company ask that they may be allowed to borrow (inclusive of £3300) £6666, and one-third on the additional capital. The special purposes fund is adopted. The standard illuminating power of the gas proposed is 14 candles, using in testing the "Metropolitan" No. 2 burner and the Harcourt 10-candle pentane lamp. The Company adopt the permissive power in regard to their gas dealings, by extending section 13 of the Gas-Works Clauses Act, 1847. They also ask for permission to make application for an Electric Lighting Provisional Order. [*Parliamentary Agents: Messrs. Martin and Co.*]

The Yorktown and Blackwater Gas Company's Bill proposes that the promoters shall be clothed with electricity powers, new financial authority, and other rights. The authorized capital of the Company, under their Act of 1904, is £50,000, of which £11,800 was in that Act described as original capital, old additional capital, and old preferred capital, and £38,200 as additional capital. The borrowing power in the Act is limited to £16,666 13s. 4d. The Company have raised and expended the whole of their original capital, the old additional capital, the old preferred capital, with £20,915 10s. 3d. of additional capital, and they have borrowed on mortgage £8250. It is suggested that additional capital powers be granted not exceeding in the whole £50,000, with one-third borrowing powers—the moneys to be applied at discretion between the gas and electricity stations. By the North Camp and Farnborough District Gas Company's Order, 1877, that Company were authorized to supply gas in part of the parish of Frimley, and such powers were transferred to the Aldershot Gas and Water Company by their Act of 1896, but no supply has been afforded. The Aldershot Company were also, by their Act of 1901, authorized to supply gas in part of the parish of Yately, but no such supply has been given. The present promoters submit that it is expedient that the powers of the Aldershot Company in these respects should be repealed; and they ask that their own limits be extended so as to include defined parts of the parishes of Frimley, Yately, Finchampstead, and Wokingham Without. Concerning the proposed electricity supply, the limits specified are Frimley, Hawley with Minley, Yately, Sandhurst, Crowthorne, Finchampstead, and Wokingham Without. The use for electricity generating purposes of lands scheduled to the 1904 Act, and now held by the promoters, is proposed. All the powers necessary to the carrying on of an electricity supply business for lighting, power, &c., are incorporated in the measure, including one providing for the payment of a minimum annual sum where a supply is provided and there exists a separate service. The repeal of the Camberley Electric Supply Company's Order of 1906, authorizing the supply of electricity in Frimley, Sandhurst, and Crowthorne, is asked for; the powers not having been exercised. There is provision for purchase by the local authorities of Frimley, Easthampstead, Wokingham, and Hartley Wintney, of so much of the electricity undertaking as is situate in, and as appertains to the supply of, their respective districts, by giving six months' notice in writing at the expiration of 21, 28, or 35 years from the passing of the Act. The Company are proposing, under the new order of things, to exchange their name for the more extensive one of the "Yorktown, Blackwater, Camberley, and District Gas and Electricity Company." Separate accounts of the gas and electric undertakings are to be kept, a renewal fund is proposed, and provision is made for a reduction of the price of electricity when expenditure, payments to renewal fund, and a dividend of 7 per cent. on the electricity capital are met out of the electricity revenue. [*Parliamentary Agents: Messrs. Hargreaves and Crowthers.*]

STREET LIGHTING IN ST. MARYLEBONE.

An Inglorious Victory for Electricity.

THE debate on the question of whether application should be made to the London County Council for a loan of £10,000 in respect of the estimated cost of installing electric light in place of gas in 1964 street lamps in St. Marylebone, which was adjourned (against the wishes of the advocates of electricity) on the 17th of December, as stated in the "JOURNAL" the following Tuesday, was resumed and concluded on Thursday last, as will be found from the report of the proceedings given elsewhere.

The *agenda* contained a report on the subject from the Electric Supply Committee, which constitutes as severe an indictment as could be imagined of the business capacity of that Committee and of the Special Committee which was appointed by the Council to report upon the question of street lighting. It commenced by saying that the adjournment of the discussion had given the Committee an opportunity of putting the figures before the Council "in more detail." What the Committee consider "more detail" may be gathered from the following. In their previous report, they recommended the borrowing of £10,000, to cover £3928 for the connection of the lamp-posts to the street cables, and the cost of the lanterns, switches, lamps, &c., adding that, in the event of the tenders for the latter being less than the estimate, only the smaller amount would be borrowed. Their later report states that they originally estimated that the installation would cost £8336, including £4168 for the cable connections—a trifling error of £240 to which it is perhaps unkind to call attention.

The report proceeds in these words:

> We have since been supplied with further particulars and *think* the estimates for connecting lamp-posts might safely be as follows:—
>
> | | |
> |---|---|
> | Connecting lamp-posts . . . . . | £4168 |
> | Lanterns and fittings . . . . . | 3687 |
> | | £7855 |

These are all the "further details" given. The report goes on:

> We thought at first that it might be desirable to incur a little additional expenditure in adopting a better type of lantern; but having viewed various lanterns—and considered the quotation of the Gaslight and Coke Company—we have come to the conclusion that the extra capital expenditure would not be worth while.

The thorough and exhaustive manner in which the proposal to instal electric light in the streets was considered in its every detail before it was submitted to the searching glance and unbiased judgment of the Special Committee, and then to the informed and impartial consideration of the Council, is clearly demonstrated by the foregoing extract, is it not? "We thought at first," "we now think, the estimates might safely"—"we" obviously are not sure of anything, except that we mean to undersell the Gas Company!

But that is nothing to what follows.

> The price we proposed to charge the Council (which was included in our offer to do the public lighting for an inclusive annual payment of £8650) was at the ordinary tariff—viz., 8d. per unit for 500 hours, and 1d. per unit afterwards. We thought it very undesirable that the lighting of the streets should be done at lower than the ordinary tariff; but we find"—after seeing the quotation of the Gaslight and Coke Company—"that the Council are entitled to be treated as one consumer in respect of the whole 1964 public lamps, and, like other large consumers, be allowed a discount of 25 per cent. for prompt payments. This will reduce the annual sum payable by about £1300; so that although the Council have agreed to our lighting the public lamps for the inclusive sum of £8650 per annum, the amount we propose to charge"—now that we know the price quoted by the Gas Company—"will be £7350 per annum. . . . It is easy for the Gas Company, knowing the price quoted by us"—with full knowledge of the cost of gas lighting—"to make a lower quotation."

Our interpolations are, we think, sufficient comment here on the hypocritical dishonesty of the report. The Committee added that, with regard to the capital expenditure, a difficulty had been anticipated with the London County Council; but they said: "We cannot see, in view of the figures stated, that the County Council can reasonably withhold consent to the necessary loan, and if they do so, we must appeal to the Local Government Board." No; we do not suppose they can see; for none are so blind as those who will not see. But we do not think the County Council will have much difficulty in seeing the rottenness of the foundation on which the Borough Council's application rests. In conclusion, the Committee amended their recommendation that a loan of £10,000 should be applied for to one asking for a loan of £8000.

The Gaslight and Coke Company were not long in moving after the *agenda* for Thursday's meeting was in the hands of members (which was on the preceding Tuesday); the following letter being sent to each member of the Council last Wednesday:—

Street Lighting.

Dear Sir,—In view of the fact that the adjourned debate on the proposed substitution of electricity for gas for street lighting will be resumed at to-morrow's meeting of the Marylebone Council; that any letter now addressed to the Town Clerk would apparently not come before the Council at that meeting; and that this Company, whose interests are vitally affected, will not be represented at that meeting, while their competitors (the Electric Supply Committee) will not only be present, but have power to vote in favour of the acceptance of their own tender—I am submitting herewith for your consideration a memorandum dealing with the report of the Electric Supply Committee of the 6th inst. which appears upon the *agenda* for to-morrow, and placing the Company's side of the question before you. This memorandum I will ask you kindly to read in conjunction with my letter of the 9th ult. to the Town Clerk, which is printed in to-morrow's *agenda*.

I will only mention here the argument which is most strongly pressed upon councillors on all occasions such as these—namely, that it is bad business not to support their own enterprise. The soundness or otherwise of this argument depends, I would submit, entirely upon (1) whether the ultimate result is one of gain or loss to the ratepayers—that is to say, whether the profit, if any, to the municipal undertaking is greater or less than the extra cost, if any, to the general rate *plus* the loss to the rates by the subsequent reduction in the rates paid by the Gas Company; and (2) whether the illuminating value obtained from electricity is greater or less than that obtained from gas.

It is obviously bad business to buy an article of municipal manufacture at a price which represents a profit to the municipality less than the excess cost of that article over its competitor of private manufacture, or at a price which represents a loss to the municipality greater than the saving in cost effected. For example, to pay £1000 a year for electric light to the municipal undertaking, out of which sum that undertaking made £100 a year profit, when equal illumination could be obtained from company supplied gas for £500, would be bad business for the ratepayer to the tune of £400 a year. A failure to appreciate this truth has led some Metropolitan Boroughs into increasing the annual cost of street lighting by many thousands of pounds, while the electrical undertaking contributes nothing to, or draws largely upon, the general rate, and the streets are indifferently lighted. If this is not considered "bad business" from the ratepayers' point of view, it is difficult to know what would be.

In the present case, our contention is that the proposals of the Electric Supply Committee amount to the substitution of lamps which will give certainly not more than two-thirds—probably not more than one-half—of the light to be obtained from the existing gas-lamps, at a price which represents a loss to the electric light undertaking greater than the saving to be effected in the lighting rate. The arguments supporting this contention are contained in the accompanying memorandum.

I may add that, if five years is considered by the Council too long a period for which to commit themselves to a continuance of gas lighting, the Company would be prepared to accept a three-years contract on the terms quoted. At the end of that time, there is at least an equal probability of further improvements and economies having been effected in gas lighting as in electric lighting. An acceptance of the Electric Supply Committee's proposals would, in view of the capital cost entailed, commit the Council to the suggested altered system of lighting for considerably more than five years.

In conclusion, I may say that all the Company desire is fair play—a decision of the question of electricity *versus* gas on its merits; and, in view of the very great disability at which they are placed by having to compete with an opponent that is represented on the jury, they appeal to you to give very careful consideration to the matter before coming to a decision thereon.

(Signed) D. MILNE WATSON, General Manager.

The memorandum which accompanied this letter was as follows:—

MEMORANDUM ON THE REPORT OF THE ELECTRIC SUPPLY COMMITTEE OF THE ST. MARYLEBONE BOROUGH COUNCIL, ON THE QUESTION OF THE PROPOSED SUBSTITUTION OF TUNGSTEN ELECTRIC LAMPS FOR INCANDESCENT GAS-BURNERS IN 1964 STREET-LAMPS.

Comparative Annual Costs.

The Electric Supply Committee first offered to charge the Council £8650 per annum for the supply of the suggested electric lamps, or £168 less than what they knew was the present cost of the existing gas-lamps. The Special Committee asked for no tender from this Company, but recommended the acceptance of this offer. The Company submitted proposals which would reduce the cost of the 1964 gas-lamps in question to £8301 per annum, with a further saving of £350 per annum on the gas-lamps which are not included in the electric light scheme.

The Committee now reduce their quotation by £1300 a year; thereby showing an apparent saving over what the cost of gas lighting under the Company's quotation would be of £600 a year; and, having taken the lead in under-quoting the ascertained cost of the competing illuminant, in this case as in that of Oxford Street lighting, they assume an injured air at the Company putting forward proposals which are more advantageous to the Council than their own, and call attention to the fact that the Company are able to quote lower prices now than they did five years ago, when they themselves have reduced their quotation 15 per cent. after the lapse of as many weeks!

The Company have no amendment to make in the prices quoted in their letter of Dec. 9, 1908; but, in view of the doubt that might be raised by a paragraph in Messrs. S. Pontifex and Co.'s letter, as to whether these prices cover the making good of lamps damaged by vehicular traffic, it may be stated here that such making good is covered by the prices quoted.

It should be pointed out that the reduction of £1300 per annum now made by the Electric Supply Committee does not affect the position of the ratepayers in Marylebone one penny, for any reduction in the price paid to the Electric Supply Committee is necessarily balanced by a reduction in the profit (or an increase in the loss) accruing to the ratepayers' electrical undertaking from the transaction.

The whole question is, how the price now quoted for the electric lamps compares with the price quoted for gas lighting, after allowance has been made for the profit or loss that would accrue to the Electric Supply Committee.

As the prices charged in St. Marylebone at the present time do not produce a profit for the undertaking, in spite of the sinking fund charges representing only 1½ per cent. on capital outlay (against 4½ per cent. regularly written off by the borough of Hampstead), it cannot be contended that the price of 1·416d. per unit proposed to be charged for

the current supplied to the public lamps represents any profit to the undertaking to set off against the above-mentioned, or a greater, loss.

Inasmuch as the public lighting load comes on top of the "peak" load, capital and running charges must be taken into account, and not, as has been argued, merely the cost of fuel, unless, indeed, it is assumed that the business of the electrical undertaking will never expand beyond its present volume, for which the existing plant is stated to be more than sufficient.

It will therefore be seen that, assuming that the estimated cost of installation would not be exceeded, the cost to the ratepayers of the proposed electric lighting scheme would be £7350 *plus* a loan of about £1300, or the original scheme of £8650 per annum first quoted by the Electric Supply Committee. This represents a saving of £168 per annum over the present cost of gas lighting, while the Company's offer represents a saving of over £860 a year.

Total annual charge quoted . . . . . This includes interest and sinking fund charges on the (revised) estimate of installation cost, £7855, which may, of course, be exceeded. These charges, spread over ten years, with 4 per cent. interest on the amount outstanding each year, would average per annum	£7350 942
Leaving . . . . . as the charge for current, attendance, and upkeep. As 25 per cent. on the gross charge for current is stated to represent about £1300, the net annual charge for current (averaging 1·416d. per unit) would amount to	£6408 3900
Leaving . . . . . for attendance and upkeep. Each tungsten lamp would require renewing at least four times a year. (A firm of contractors recently guaranteed an average life of 700 hours per tungsten lamp for street-lighting, which would mean over 5½ renewals per year of 3940 lighting hours.) Allowing for only 4 per annum, and for a possible reduction in the present price of these lamps, the cost of these renewals, with labour, would amount to not less than 12s. 6d. per tungsten lamp per annum. The total cost of renewals would therefore be: 1114 lamps at 12s. 6d., 827 at 25s., and 23 at 37s. 6d., amounting to	£2508 1773
Leaving . . . . . to pay for the inspection, lighting, extinguishing, cleaning, painting, and repairing of the lamps, including the making good of damage by contact of vehicles, which would entail the replacement of one or more expensive filament lamps instead of a similar number of cheap mantles. An average charge of 21s. per lamp per annum would barely cover these costs, and would amount to	£735 2062
Leaving . . . . . as a conservative estimate of the loss on the transaction.	£1327

Comparative Illuminating Power.

Moreover, the proposed electric lamps would give a *nominal* illuminating power only two-thirds of the *average actual* illuminating power which should be given by the existing gas-lamps. The Council's Contractors, who complain of any suggestion being made that the gas-lamps have not been maintained by them in the most efficient manner possible, may be left to settle that point with the Committee who caused photometric tests to be made of those lamps, and reported that they gave 2½ per cent. less light than the 40 to 50 candle power claimed for the tungsten lamps. If these tests were accurately made upon fair average lamps, then the lamps cannot have been properly maintained. If the lamps have been properly maintained, the tests were taken in such a manner as not fairly to represent the average result obtained.

The fact remains that the gas-lamps now in use, if they are not, can—and, if the Company were entrusted with the work, should—be maintained at 50 per cent. higher illuminating power than that claimed for the electric lamps, which latter is, of course, subject to deduction for depreciation during the life of the lamps. That depreciation, if the voltage were not maintained at the precise figure best suited to the lamps, would be serious.

The Company respectfully claim that no case has been made out for inflicting upon them—ratepayers in the borough to the amount of £7000 a year—a serious loss of business, which they would have faced with equanimity if it had been incurred in fair and open competition, strictly on the merits of the case. They further claim that the proposed electric light scheme would entail a loss upon them as well as upon all the other ratepayers in the borough, and at the same time would involve a serious reduction in the efficiency of the street lighting. They submit themselves with confidence to the equitable consideration of the councillors.

(Signed) D. MILNE WATSON, General Manager.

This memorandum, as one of the members observed in the debate last Thursday, gave the Council more information about their own Committee's proposal than they had ever received from the Committee; and no attempt was made by any advocate of electricity to dispute any of the figures contained in it.

But, as has so often been the case before with municipalities owning an electric light works, the majority of the Council were not open to reason in this matter, and appeared to view with equanimity the shifty policy of the Electric Supply Committee. One Councillor indeed, Mr. Garrould—it is true that he is a member of the Electric Supply Committee—said he could not see that the Council had treated the Company badly. "He had never heard of any other large contractor to the borough coming forward at the end of the contract to complain that he had been unfairly treated because the contract had not been renewed. But has he ever heard of a contract for £8650 a year being given to any firm, without a fresh tender being invited from the firm previously contracting against whom there has been no complaint? That is the point, which Mr. Garrould has altogether missed or ignored. He proceeded to refer to the Company's complaint as to the unfairness of the Special Committee containing as a majority of its five members three members of the Electric Supply Committee. "They ought," he said, "to consider this, that they, the members of the Council, were sent to the Council by the ratepayers to study the interests of the borough, and that they served on various Committees, not to study their own interests but those of Marylebone. If they looked at the names of the gentlemen who served on the Special Committee, they would see that they were all gentlemen above suspicion." This sounds very pretty; but Mr. Garrould knows perfectly well that the first aim and object of gentlemen who have been largely responsible for the burdening of a municipality with an electric light undertaking is to make a big show of business done by that undertaking, and cannot, being human, be relied upon to take a broad, ratepayers' point of view of any proposal to give more business to the undertaking. Moreover, the Special Committee was appointed specifically to consider and report upon the proposals of the Electric Supply Committee. What a farce, then, so to constitute the one that it was really only a section of the other! The obviously fair and proper course was to nominate a number of members of the Lighting Committee (none of them connected with the Electric Supply Committee) to constitute a Special Committee to receive and to report upon proposals and estimates from the Electric Supply Committee and the Gas Company, calling before them representatives of both to explain and support their respective schemes. If Mr. Garrould really cannot see the vital difference between this method of procedure and that actually adopted, we shall be very greatly surprised.

The recommendation of the Committee was strongly opposed by Colonel Maude and Alderman Martin Morris, who suggested that one street—say, Baker Street—should be lighted by the proposed electric lamp as an experiment. But, knowing how damning such an experiment would be to their scheme, the Electric Supply Committee have opposed such a proposal all through; Mr. Debenham having actually had the audacity to state that it was not possible to experiment on a small scale! Mr. Lea-Smith stated that, as he was a shareholder in the Gas Company, he should not take part in the debate or vote upon the recommendation, and two other shareholder members refrained from voting. Yet the Gas Company's competitor was represented by numerous speakers, and the majority who voted for electricity was comprised largely of members of the Electric Committee! Such are the ways in which private enterprise is shackled and treated unjustly when in competition with municipal trading.

After strong, but fruitless, protest by Alderman Dennis against the way in which the whole business had been conducted, the Council voted on an amendment proposing that the recommendation be referred back—for, 17; against, 26. The recommendation was thereupon agreed to. The matter now awaits the decision of the London County Council as to whether or not they will grant the loan of £8000.

Scottish Junior Gas Association (Western District).—The members of the Western District Division of the Scottish Junior Gas Association will visit the Dawsholm Gas-Works of the Glasgow Corporation next Saturday afternoon.

Institution of Civil Engineers.—At the meeting of the Institution last Tuesday, it was announced that the following gentlemen had been transferred from the class of associate members to that of members: Mr. N. F. Dennis, Borough Engineer of West Hartlepool; Mr. A. E. Douglass, of the Water Department, Birmingham; Mr. A. F. Jacob, of the Prospect (N.S.W.) Water-Works; and W. A. Jenkin, of the New Water-Works Company, Jersey.

Gratuity to Mr. Isaac Carr.—In another part of the "JOURNAL" will be found the report by Mr. Isaac Carr, the Gas and Water Engineer of the Widnes Corporation, on the final efficiency tests of the new pumping-engine at Stocks Well—an extension of the water-works plant which was brought into use some months ago. These additions were carried out by Mr. Carr entirely unassisted by a consulting engineer, with the consequent saving of fees; and he was able to effect other economies. In recognition of this, the Gas and Water Committee resolved to award him a gratuity of £250 guineas, for "valuable professional services rendered outside his ordinary official duties;" and the recommendation came before the Town Council last Tuesday. It is somewhat surprising that nearly an hour should have been occupied in discussing it, seeing that the Chairman of the Committee (Alderman Timmis) stated that they were proposing to give only one-fourth of the £1000 they would have had to pay a consultant. Of course, there were the usual remarks about the proposal being a "dangerous precedent," and not a little personal feeling was displayed during the discussion. However, in the end, it is gratifying to find that an amendment to refer the matter back was defeated. If it had not been, it would have been unjust to an official whose "whole and sole ambition," as Alderman Quinn put it, "was to see how things could be done in the best possible manner without extravagant expenditure being incurred."

INFORMING THE CONSUMERS.

In the "Journal" for Nov. 17 last, there appeared an article, headed "Work among the Gas Consumers," in which it was suggested that sufficient was not in many instances being done by gas suppliers in informing their consumers how to make reliable calculations to test the oft-repeated averments of the chief competitors that "electricity is cheaper than gas." Since then we have learned that, at the very time the article was written, the matter was under the consideration of certain gas companies, and others, after the necessary changes in the figures have been made, have had reprinted the suggestion that was put forward in the article referred to. There was noticed a very striking pamphlet the other day issued by the Bournemouth Gas Company, in which an easily followed comparison was made of the relative costs of gas and electricity. A bundle of literature, in effective style, has just reached the gas consumers in South London, among which is found one card which is headed with the pertinent inquiry, "Is Electric Light now as Cheap as Incandescent Gas Light?" It is the metallic filament lamp that the electricians are using as the instrument for covering their assertion as to cheapness being now on the side of electricity. Of course, gas engineers know that the statement is untrue. Some householders, however, ignorant of these questions, may accept the statement. It is very easy to refute it, by those who have the knowledge. And the householders of South London have been shown how to make their own calculations. They now know that, even with an upright incandescent gas-burner, they can have a light of 60-candle power against a light of 50 candles with the Osram lamp, for 1000 hours, and be 8s. 11d. in pocket. That is to say, with a burner and mantle using 4 cubic feet of 2s. 3d. gas an hour, in 1000 hours the cost (including purchase of burner and mantle at 1s. 10d.) will amount to 10s. 10d.; while the 50-candle power Osram lamp, including 4s. 9d. for the lamp and current 15s. at 3d. per unit, will in 1000 hours cost 19s. 9d. The literature embraces information succinctly put as to gas-fires, and on the question of illuminants and health; and there is an invitation to consumers to communicate with the Company in the event of any defect in their gas lighting or heating arrangements.

PRESENTATION TO MR. J. H. BREARLEY.

An interesting function took place at the Hotel Metropole, Leeds, on Thursday last. After the usual monthly meeting of the Yorkshire Commercial Section of the Manchester District Institution of Gas Engineers, a complimentary dinner was given to Mr. J. H. Brearley, of Longwood. Mr. Brearley has been the Hon. Secretary of the Section since its formation in 1903. But, owing to pressure of other business, he has felt reluctantly compelled to resign; and the opportunity was taken by the members of the Section to give some expression of their appreciation of the admirable way he has carried out the duties of the office.

After the dinner, the President (Mr. Charles Wood, of Bradford) presented to Mr. Brearley an 18-carat gold watch, also a beautiful silver toilet and trinket service for Mrs. Brearley. In doing so, Mr. Wood said that these gifts could not adequately express their appreciation of Mr. Brearley's services; but they would be a constant reminder to him of his official connection with the Section, and also of the high esteem in which he was held by all the members. In Mr. Brearley, they had had an ideal Secretary—one who had not only a high sense of duty, but one who knew how to make the meetings profitable to those who attended them. He (Mr. Wood) considered that the success of the Section was largely due to Mr. Brearley's untiring energy, perseverance, tact, and self-sacrifice. It was a pleasure to him to present these gifts to Mr. Brearley; and he hoped both he and Mrs. Brearley would live long to enjoy the use of them.

Mr. H. Townsend, of Wakefield, said that the Yorkshire Commercial Section had been exceedingly fortunate in its choice of President and Secretary. The former had filled the presidential chair of the Institution of Gas Engineers, in such a manner as to gain the eulogies of the whole gas profession; and the latter had received the gold medal of the Institution for his paper, on "The Testing and Hygienic Efficiency of Gas-Fires," and had since been appointed Examiner on Gas Supply under the City and Guilds of London Institute. With such officials, their meetings were bound to succeed; and he himself thought that no meetings in connection with the gas profession afforded so much pleasure and instruction as the meetings in connection with the Commercial Section, and he was sure that they were of great benefit to their respective employers.

Mr. Brearley, in replying, said he was somewhat embarrassed not only with the splendid gifts they had so kindly presented to him, but also with the wealth of praise they had showered upon him. It was a pleasure to know that his efforts to serve the Section had been appreciated. He said the duty had been a pleasure; the chief reason being, that it had brought him into closer connection with the President, Mr. Wood, and with his fellow members. He thought a great deal of the success of the Section was due to the President, for the great interest he took in it, and for his kindness and courtesy to every member of it. He thanked them on behalf of himself and Mrs. Brearley, and could assure the members that they would always deeply appreciate not only the gifts but the kindness that had prompted them.

It will be remembered that both the Lancashire and Yorkshire Commercial Sections of the Manchester Institution of Gas Engineers were established some six or seven years ago as the result of a discussion on coke matters. So far as the Yorkshire Section was concerned, Mr. Brearley took a prominent part in its formation, and evidenced his enthusiasm in the enterprise by accepting the post of Hon. Secretary. In this capacity, he has ever since devoted a good deal of thought and time to furthering the interests of the Section, and has largely contributed in making it a success. Finding of late that the assumption of other responsible duties has also required time, and realizing that even the hardest of workers can undertake too much, Mr. Brearley decided to resign his position as Secretary to the Section. This he did at the end of last year; being succeeded by Mr. F. H. Pickles, of Kildwick.

TESTS OF SIMPLE FIRE EXTINGUISHERS.

We have received from Mr. Ellis Marsland, the General Hon. Secretary of the British Fire Prevention Committee, two of the series of "Red Books" (Nos. 128 and 133) issued by the Executive. Many of our readers are doubtless acquainted with the nature of the work carried on by the Committee, the Chairman of which is Mr. Edwin O. Sachs, F.R.S.E., whose name is well known in connection with literature on the subject of fires in theatres; but it is not generally known that a large proportion of it comprises tests of ordinary building materials and fire appliances in common use. A considerable number of patent fire extinguishers, both liquid and in powder, have lately been submitted to the Committee for test; and, in order to obtain some idea of their relative value and efficiency, they thought it advisable to undertake a series of tests with the simplest of "first aids" in case of fire, such as the household bucket of water, the hand-pump, cloths, sand, &c. Reports on certain of these tests form the subject-matter of the two little books under notice.

In a prefatory note to the particulars of the experimental tests of the bucket of water, &c., Mr. Sachs points out that though the chemical fire extinguisher, if so constructed that it can be readily and easily handled by parties not conversant with its action or peculiarities, has considerable advantages, it should not be forgotten that the ordinary bucket of water and hand-pump possess a very high fire-extinguishing efficiency. Indeed, an experienced fire office inspector some years ago expressed the opinion that there were few large fires which might not have been prevented by the application of a pailful of water at the right moment. Unfortunately, in many cases there is no one present at the outbreak to use these simple means should they be provided. The tests reported upon in the other book relate to the application of asbestos cloths, sand, and steam to burning petrol, &c.; and they were carried out towards the close of last year at the instance of the Incorporated Association of London Dyers and Cleaners. The details of the tests are preceded by a few remarks by Mr. Percy Collins, F.S.S., one of the Executive members of the Committee. He records that the application of asbestos cloths was certainly effective in subduing fires caused by spirit vapour, and says that in his opinion they form most valuable "first aid" appliances. Sand was valuable; but some further tests as to its efficacy are required. The effect of steam was most marked. While there was plenty of ventilation in the upper part of the walls of the hut in which the tests were carried out to correspond with what would be arranged for in buildings occupied for processes of manufacture requiring the use of volatile spirit, the steam quickly diffused throughout the hut and quenched the fire. Mr. Collins points out, however, that the quantity of steam available should bear a suitable relation to the cubic contents of the room or rooms to be protected. He says these tests were most instructive.

The two books under notice are of special interest, as they deal with fire-extinguishing appliances of simple character which could be readily brought into use. They are published at the offices of the British Fire Prevention Committee, 1, Waterloo Place, Pall Mall, at the price of 2s. 6d. each.

At Bolton, last Friday, Mr. George Swainson, the Borough Treasurer, announced his resignation, on account of ill-health. He has held the position since 1875. He was the first President of the Institute of Municipal Treasurers.

The insertion of a check-valve in the gas-supply line between a suction producer and a gas-engine operated from it has been found effective (according to a recent paragraph in "Engineering Record") at a number of gas-power plants, in reducing the troubles resulting from firing-back in the intake line caused by poor gas at times of cleaning the producer or changing the load. Without the check-valve, the firing-back in the supply main usually partially consumes the gas in it back to the purifier or scrubber, and so weakens it that, particularly in the case of a long line, a considerable period intervenes before gas of good quality again reaches the engine; causing a drop of speed in the latter, or sometimes even a stoppage. By placing a swing check-valve in the line close to the engine throttle, and opening towards the latter, such a firing-back cannot reach the gas beyond it, and has no appreciable effect on the engine's operation.

INSTITUTION OF MUNICIPAL ENGINEERS.

There was held at Caxton Hall, Westminster, last Saturday, a General Meeting of the Institution of Municipal Engineers, the formation of which was noticed in the "JOURNAL" a few months ago. The attendance was not very large; but all the four papers submitted were discussed—particular interest being naturally taken in the subject of roads. One of the contributions dealt with "Street Lighting in the Smaller Urban Districts;" and the main points of this and of the remarks to which it gave rise will be found elsewhere in to-day's issue. The chair was occupied by the PRESIDENT (Mr. John T. Pegge, City Engineer and Surveyor of Durham).

PRESIDENT'S ADDRESS.

The PRESIDENT, in the course of a brief Inaugural Address, said that the professional Societies and others would probably ask the reason for bringing into being another Municipal Institution; but if they would examine the public records, he thought they would see that, whenever a profession was stable and active, there would generally be several Societies, all doing excellent work, and each stimulating the others in their efforts to improve the status and knowledge of the members of that profession. Their Institution thought there was need for closer association of municipal engineers and surveyors throughout the country, and that an organization for this purpose must not be a "close corporation," but every member should feel himself in touch with headquarters. Existing Societies of a like nature should be regarded rather as pioneers; and they should not by word or deed ever attempt to minimize the good already done, or being done, by others. They knew that, though they covered much of the ground already partly worked by others, yet their sphere of action was so much more extensive (as was set forth in the bye-laws) that an enormous area of untouched and valuable ground was available, which was only to be won by hard work and organization. He would further like to remark that they should always be ready to use what influence they possessed as an Institution to combine with other Societies for the attainment of their objects.

In the term "municipal engineers," he said, were included all engineers and surveyors employed by local governing authorities. The profession of municipal engineering had never yet received proper and full recognition; and it was the duty of the Institution to set about obtaining this. Every engineer must put his shoulder to the wheel; and there must be no narrow distinctions, no petty prejudices, and no invidious exclusions. Too often the Council of a Society ran upon entirely the wrong lines. Their first question on receiving an application for membership was, "How can we keep this man out?" "This," said the President, "is a spirit which cannot be too deeply deplored. It is fatal to progress, and is due mainly to the jealousy of those who, having been elected themselves, desire to consort only with the very highest in the profession." The position of the municipal engineer was not, of course, always satisfactory; and one of the important planks in the forefront of the Institution's platform would be the attainment of reasonable fixity of tenure, standard rates of salaries, and pensions according to length of service.

Alluding to the leading points of an engineer's and surveyor's work, the President remarked that they would remember no doubt the scoffing and opposition to electric lighting, power, and heating by the great gas interests. He did not know whether there were municipal gas or electrical engineers present; but did it not seem singular that both these methods of producing and reproducing light, heat, and power, one from the air direct and the other from the earth indirect, had advanced by leaps and bounds—each seeming to have tended to perfect the other, so fierce had been the emulation? In the first instance, electrical inventors tried to imitate gas methods of lighting and fixtures, and they even produced to the present day excellent electric candles and candelabra. Now they found gas-fittings in bulbs, like electric lights, with door-switches, &c. All this sorting out of the best of the ideas of each other was tending to greater convenience, comfort, and cheapness to the consumer. The later developments in electricity, of producing and distributing at enormous voltages, and transforming down to the statutory low pressures, had enabled works to be established at the pit-mouth, and places to be supplied some 30 and 40 miles away. In this, gas had not yet followed the lead, owing to the danger and loss due to compression; but they might depend upon it that the delay would not be for long. He must admit that he feared the great danger side of this high-voltage transmission; but it was not for him to say whether sufficient safety measures were being taken to prevent possible great loss of life.

The comforts and conveniences of living would not be worth one moment's purchase without there was a sufficiency of water. He well remembered how eagerly he devoured the well thought-out schemes in the "Journal of the Society of Arts," for the collection and distribution of water, by carefully mapping out and controlling all the gathering-grounds, so that this precious and vital fluid should be conserved to the use of the people. Every time he had seen London, Liverpool, Birmingham, Leeds, Bradford, Manchester, Glasgow, and other large towns, taking up big tracts of land and water, and storing millions of gallons in excess of their needs, he called to memory these excellent schemes, which, in his opinion, should have been by now the foundations of an invaluable and definite Act of Parliament.

As to the digging of trenches, the President asked what profit it was to the surveyor if his efforts in getting perfect gradients and true lines in his roadways, kerbs, and paths were to be counteracted by the constant breaking-up of streets, with but little regard to the public convenience, and still less to the value of surface material. The Government, companies, or councils in the future who ran the telephones, telegraphs, water and gas mains, and electric cables should (wherever two or three were gathered together) be compelled to build underground ferro-concrete subways, to put an end to this annoyance and discomfort. It would in the long run also be an enormous saving to them in the matter of maintenance.

In conclusion, he acknowledged the services rendered to the Institution by the Secretary (Mr. B. Wyand), who he remarked was a born organizer, and deserved for his hard work the hearty thanks of the members.

ROAD MANAGEMENT AND REPAIR.

Mr. J. H. EVANS (District Main Road Surveyor to the Hertfordshire County Council) submitted the first paper, which dealt with road management and repair under modern conditions of traffic. He said the question of highway administration was one of the most important subjects the municipal engineer had to face at the present time. Nowadays it did not suffice to apply macadam to a road surface, regardless of how the material would wear. It should be applied and consolidated in such a manner as to obtain the maximum wear and the best results in every way. They must, he said, all be interested in the cure and prevention of dust upon the highways; and he was far from believing that tar—or, in fact, any material in which tar formed the chief ingredient—was the last word in regard to this problem. Tar had not as yet had a proper chance of showing its benefits as a dust minimizer. In almost every county of England and Wales it had been tried during the past couple of years or so; but he ventured to think with only indifferent success. When tarring was carried out, it was a mistake to immediately cover it with sand. Small clean, dry chippings should be employed. Not until tar was standardized, as suggested by Mr. Brown, of Nottingham, could it be relied upon, as it differed so greatly in every district. Tar which had been highly distilled was unsuitable for painting purposes; but all tar should certainly be dehydrated before use. As the tars obtained from different gas-works differed, so also did the quantity of water they contained. The pressure at which the tar was applied by some machines he believed to be too great—a pressure of between 50 lbs. and 60 lbs. was ample; and if the machines were incapable of delivering the quantity required with this pressure, others must be built with pumps of the necessary capacity. The machines would then last longer, and do their work better. Too much attention was also given to the temperature at which the tar was applied. If it had been dehydrated, a temperature of 150° to 160° Fahr. would be sufficient. No doubt footpaths were greatly improved by being painted with tar; and a small machine having a capacity of about 20 gallons, that could be used by an ordinary roadman, was badly needed. So far, he was not favourably impressed with the idea of tar being used in the binding of metal when surfacing a roadway.

Mr. C. H. EYLES (London) remarked, in the course of the discussion, that some people suffered very much from the powers of companies to open up roads. It was so in his district. Perhaps they put down a new road, and almost immediately the water company came and took it up again. To him, as a municipal engineer, this was disgusting; but they had to submit to it. He quite agreed with what the President had said on the subject.

DUTIES OF THE TWENTIETH CENTURY MUNICIPAL ENGINEER.

Mr. FRANK LATHAM (Borough Engineer of Penzance), in a paper which was stated to be a first instalment, dealt with the status and subject-detail appertaining to the duties of the twentieth century municipal engineer. The office of municipal engineer, he remarked, had become so much bound up with the general economy, comfort, healthiness, and prosperity of cities and towns, that the position must be considered one of much public importance. There was no profession demanding more constant reading and application, in order to keep pace with ever-changing and progressive methods; while interchange of ideas with his professional brethren was an absolute essential. The position of the municipal engineer was far from amply recognized to-day; and therefore too much importance could not be attached to the establishment of an Institution with the aim of maintaining the status of the municipal engineer who had regularly passed through the stages of preparation, with the intention of attaining a higher standard of efficiency.

As to the duties of the position, the author remarked that the municipal engineer was expected to be able to advise his council on all engineering matters—whether it was the sewering of a town; the construction of sea-walls, groynes, or piers; the laying down of electric tramways, lighting stations, or gas-works; the construction of bridges or viaducts, refuse destructors, or water-works (including well-shafts, adits, reservoirs, pumping machinery, and allied plant); the designing of buildings; or the laying out of pleasure grounds, parks, or promenades. He must also be able to draw up specifications dealing with every description of works; to prepare reports and estimates of a very varied nature; and be well acquainted with the properties of materials, and with the cost

and working of steam, gas, oil, and other engines, and all kinds of machinery. In addition to these, multifarious other duties were enumerated by Mr. Latham, who added that in spite of all this municipal engineers remained signally unprotected by law, unprovided for by pension or superannuation, and even degraded by the meagre manner in which their professional status was regarded by many authorities.

Scottish Municipal Law.

Mr. John A. M'Leod (Surveyor and Water Engineer of Girvan) was responsible for the third paper, which consisted of comments on Scottish municipal law and administration. He referred to the Public Health (Scotland) Act, 1897, and the Burgh Police (Scotland) Act, 1892, and said he thought that the time had now arrived when Acts of Parliament dealing with municipal administrative works and public health should be very greatly simplified, and confined entirely to such matters and nothing else, so that the surveyor and sanitary officer could devote the whole of their time to practical work, instead of taxing their brains in studying, or endeavouring to interpret the meaning of, obscure sections of mutilated Acts of Parliament.

Street Lighting in Small Urban Districts.

The last paper presented was by Mr. E. F. Willson, the Surveyor to the Epping Urban District Council. An abstract of this, and a report of the discussion to which it gave rise, will be found on p. 181 of this issue.

At the close of the business the President was thanked for his conduct in the chair at what was the first convention of the Institution. In the evening the President held a reception at the Victoria Mansions Restaurant; and an excellent programme of music was much enjoyed by the hundred or so members and friends who were present.

A VISIT TO THE KENSAL GREEN GAS-WORKS.

London and Southern District Junior Gas Association.

A most successful visit by the Association was paid to the Kensal Green works of the Gaslight and Coke Company on Saturday afternoon, when about sixty members turned out. They were met at the works entrance by the Engineer, Mr. A. S. Baker, and his Assistants, Mr. C. A. Cunnold and Mr. E. J. Cossey, who personally conducted them through the works in batches of twenty each.

There are a good many points of interest about the works, which are situated close to the main-line of the Great Western Railway. In the first place, though the coal is all rail-borne, it is tipped into barges and brought into docks in the works—the reason being that the Railway Company find it cheaper to deal with it in this way than to provide the accommodation on the main-line that would otherwise be required. It must be remarked here that the works are in two parts—the old and the new—which are really kept entirely separate from each other at the present time, though, of course, everything is connected up, so that if needful the gas from one retort-house could be passed through the plant belonging to the other. The old retort-house is only brought into use, however, during the few busiest weeks of the winter, when the new house is not able to cope with the demand for gas—the Kensal Green station being, it may be pointed out, "on its own," and not in a position to draw from other works.

All through, there is an air of tidiness; and it is to be noted that the Company set their consumers an excellent example by brilliantly lighting up the works throughout with incandescent gas-burners. The works being situated in a residential neighbourhood, the greatest care has to be taken not to cause a nuisance by the emission of smoke or dust; and were it not for the announcement on the gates and the sight of the holders, one might pass along the road without being conscious of the proximity of a gas manufacturing station.

The New Retort-House and Plant.

The coal for this house, on entering the dock alongside, is picked up by means of cranes and grabs, and deposited in a coal-breaker, from which it is fed direct on to a conveyor, and elevated into position for distribution in the house. The maximum quantity of coal that can be dealt with is 60 tons per hour.

The retort-house was reconstructed in 1900-1, and fitted up with the latest labour-saving devices. The coal on being received into the house (which contains 36 beds of inclined retorts, set at an angle of 31°—each bed having eight 20 feet retorts, 24 in. by 14 in.) can be diverted to either side by means of tray conveyors, and thence on to push-plate conveyors, which take it over the coal-stores running parallel with the beds, or direct on to the main push-plate conveyor running over the bunkers and coal-measuring hoppers for charging the retorts—these being fixed the whole length of the house. The precaution is taken, in case of a breakdown, of having continuous conveyors underneath the main coal-store, for taking the coal to elevators on each side of the house and elevating same on to the main conveyor. These under-cover stores are of 4600 tons capacity; and 15,000 tons of coal are generally stored out of doors. In handling the coal in the latter case, small locomotives and 30 cwt. waggons running on narrow-gauge tracks are used in conjunction with cranes and grabs; the coal being weighed in and out of stores. In this connection, it may be said that rails are at present being laid all over the works, so as to do away with the necessity for any carrying by means of horses and carts.

The capacity of the retort-house is about 4,000,000 cubic feet per day. Eight-hour charges of 8½ cwt. each are worked; and the make is never less than 11,000 cubic feet per ton, with Midland coal. Besides the five continuous coal conveyors running from end to end of the house, it contains hot-coke conveyors on the push-plate principle for taking the coke from the two sections to the centre of the house, where it is deposited on to an inclined conveyor running to the series of coke-storage hoppers situated close to the retort-house. The coke, on arrival at the head of the elevator, has been properly quenched; and it is now screened and delivered on to a conveyor, and carried and deposited into either of the hoppers of a capacity of 30 tons each, and loaded direct into sacks, carts, or trucks, as required. The power for working the coal-handling plant of this house is supplied by means of two Galloway compound condensing engines of 120 H.P. each; and the coke-handling plant is worked by two of Grice's gas-engines of 40 H.P. each.

The gas is passed through atmospheric condensers, and by means of two Donkin exhausters is pumped on through Walker tar-extractors, the cyanogen plant—all plant being in duplicate—and "Standard" washers.

The purifying-house is a remarkably fine building, three storeys high, and containing 24 vessels, each 33 feet square and 6 feet deep. One half of the house is used for the coal-gas purification; and the other for the carburetted water gas. Each of the vessels is fitted up for three tiers of material, 7 inches deep. In the case of the coal-gas vessels, oxide of iron is used, with Weldon Mud in the check position; while for the carburetted water gas lime is employed, with Weldon Mud in the checks. The top floor of the building is used for preparing the material, which is hoisted up from the ground floor by means of four cantilever cranes. The oxide after use is dropped from the purifiers on to the ground floor, where it is revivified. Underneath the lime vessels are rails so that waggons can be run into the building and the spent lime shot into them from the bottom of the purifiers. It is then taken out to barges and removed from the works.

The storage capacity is necessarily very large; the total being 12,000,000 cubic feet, made up of six holders. The largest is a three-lift one, 240 feet in diameter, and containing 7,500,000 cubic feet. In connection with this holder a plant has been erected for supplementing the pressure on the district when required. It consists of a Sturtevant exhauster capable of dealing with about 1,000,000 cubic feet per hour; and with this apparatus any increased pressure above that which the holder throws can easily be obtained.

Carburetted Water-Gas Apparatus.

The carburetted water-gas plant which was erected by Messrs. S. Cutler and Sons, comprises six sets, each capable of making over 1,000,000 cubic feet per 24 hours.

The water-gas house is really remarkably complete in labour-saving devices—a highly interesting feature being the arrangements for feeding the coke to the generators. The coke is brought along to the house in waggons drawn by small locomotives. By means of a hydraulic lift, the trucks are next elevated to the charging floor. The coke is then tipped on to a push-plate conveyor which runs the whole length of the house, charging the overhead hoppers as may be required. Over each generator there is a charging-shoot connected with the hopper; and in this shoot there is a screen, so that all the fine dust is taken out of the coke as it passes into the generator. As a precaution, barrows of coke are kept on the charging floor; but the automatic charging arrangements are most satisfactory in their operation.

In connection with this plant, there are two 150,000 cubic feet exhausters and engines, two Westinghouse engines and Sturtevant blowers of 40 H.P., and a set of two Willans high-speed compound engines of 30 H.P. each. The necessary boiler power is supplied by four Babcock and Wilcox 124 H.P. boilers, and one Lancashire boiler of 100 H.P. There are three oil-storage tanks, of a maximum capacity of 2,000,000 gallons; the annual quantity used amounting to about 1,522,000 gallons.

The Old Retort-House and Plant—A Vertical Retort Installation.

Now we come to the old retort-house, which, as already remarked, is only used during the mid-winter season, when the demand overtakes the capacity of the inclined house. The coal delivering arrangements are similar here to those in the new house—there being a separate dock alongside for the barges. In this old house—which originally contained fifty beds of retorts 20 ft. by 20 in. by 14 in., capable of making 4 million cubic feet of gas per day—the charging is at present being carried out by hand; but a great change is coming over the scene. Though the house itself may remain "old," it is about to contain the newest carbonizing arrangements on the works; for the foundations are at the present moment being put down for an installation of Woodall-Duckham vertical retorts. In the first instance, ten sets of four retorts—or forty retorts in all—will be erected, capable of making over 1,000,000 cubic feet of gas per day. The plant is now in

hand; and it is hoped that it will be ready for working before the autumn. The coal and coke in connection with this installation will be dealt with on the latest mechanical principles.

In connection with this portion of the works, there are atmospheric condensers of ample capacity, two exhausters each capable of dealing with 100,000 cubic feet per hour and one of 200,000 feet, a Walker tar-extractor, a "Standard" washer for cyanogen extraction, and six tower-scrubbers. The purifiers in this section are sixteen in number, 30 ft. by 20 ft. by 5 ft. 6 in., with three tiers of material 8 inches deep in each. At present, lime is used in this house, with Weldon Mud in the check position.

Naphthalene Process, Etc.

There are erected on the inlet of the tar-extractors on the works two naphthalene extractors; but these are not now in use. The district is kept free of complaints from naphthalene by an installation of the Botley plant, by means of which ordinary White Rose paraffin oil is sprayed into the main in the form of a fine fog, produced by a jet of compressed gas coming into contact with a jet of oil. This is a very interesting apparatus to inspect, inasmuch as it is possible, through observation windows, to see the fine fog passing along with the gas. The plant is placed on the 36-inch outlet main from the gasholders; and it requires about 2¾ gallons of oil per million cubic feet of gas sent out.

Near the holders there is a safety governor, so arranged that should a man turn a wrong valve, the inlet of the holder would be automatically connected with the outlet, and the gas be sent straight into the district. At the same time, the governor would sound an alarm. It is gratifying to learn that so far the appliance has not been called upon to prove itself in actual practice.

It is impossible to go through the works without being struck by the completeness of the arrangements made for the men's comfort. There are lobbies provided for the stokers in which they may forget that they are in the neighbourhood of a retort-house. Cleanliness is encouraged by a plentiful supply of hot and cold water—in fact, one can hardly help envying the men their neatly fitted-up spray baths. The mess-rooms are commodious; and every man has his own locker. Indeed, everything possible is done for the men; and, judging by the orderly appearance of the rooms, there can be no doubt they appreciate it.

In case of accident, as in health, the men find themselves well looked after; for there is on the works an ambulance brigade consisting of seventeen members, all properly trained. A suitable room is kept ready for emergencies, and stocked with oxygen in cylinders for cases of "gassing," and materials for rendering first aid in the event of other accidents. There is also a concert-room or theatre, fitted with an excellent little stage.

A sign of the times is to be noticed in the fact that the Company are sinking a 10-inch bore-hole with the object of supplementing their water supply. It has now reached a depth of 400 feet; and it is the second one sunk—the first having been abandoned after reaching a depth of 650 feet.

The Coke Trade.

Before concluding this brief notice of the works, some reference must be made to the coke trade, which is quite a special feature at this station. A great point is made of endeavouring to supply different customers with just the sort of article that they require; and no quantity is too small. A large number of vans are kept at work filling orders for delivered coke; and a good business is done in supplying it in paper bags containing 28 lbs., the charge made for which is 4d. The coke is put through various sized screens—in fact, all sizes that seem to be in demand.

More than this, there is a plant erected for screening and sorting the refuse from the fires. In this way, pan breeze is obtained which is disposed of at a good price. This arrangement deals with about 20 tons of refuse a day; and the demand for the pan breeze is equal to the supply. In the case of the water-gas plant, also, the pan breeze and clinker from the generators is sorted, elevated, and screened by machinery; the plant being capable of dealing with about 15 tons a day.

General.

There are on the works chemical laboratories and photometer-rooms, and smiths' and other shops, fitted with all the necessary machine tools for maintaining the works. In the valve-room, means are provided for both telegraphic and telephonic communication with all the other stations of the Company.

After the inspection, the members foregathered in the concert room, where tea had been generously provided; and at the conclusion of this, Mr. Baker gave the members a further description of the works.

The President (Mr. W. J. Liberty) said the members were very pleased to find themselves at the Kensal Green works—the station of the old Western Gaslight Company, before its absorption into the great Gaslight and Coke Company. He had to express his surprise at the magnitude and importance of the works. He had always imagined the Kensal Green station as a small stand-by or emergency works; but he learnt that day for the first time that this station was not linked up with the general system of the Company, but was quite isolated as far as mains were concerned, and was to all intents and purposes, as far as regarded manufacture and output, a separate concern. They had witnessed different phases of gas manufacture as they had walked through the works. For instance, in No. 1 Retort-House they saw horizontal retorts with hand stoking, with beam-engines in the exhauster-house, and coke in the scrubbers. Then they visited the magnificent retort-house where there were inclined retorts. Next they were shown the excavations for the foundations of the proposed Woodall-Duckham vertical retorts, taking them into the future. The Association hoped to have the privilege of seeing these retorts working. Then the members had lingered over the carburetted water-gas plant. They were deeply indebted to Mr. Corbet Woodall, who, in writing to the Secretary of the Association in connection with the visit, suggested that they should give special attention to this apparatus, for it was most up to date, economical, well planned, and orderly. Efficiency and method were the leading principles in this house. He looked upon the plant as unique of its kind; and they were extremely grateful to Mr. Cossey for the trouble that he had taken to explain it to the members. One particular reason why they were pleased to be present that afternoon was that only the previous day they had read in the papers of the birth of co-partnership in connection with this great Company, by which 11,000 or 12,000 men were being given an interest in the concern. He believed it would be for the benefit of both the Company and the men—that the men would show their interest in this new venture by putting their backs into their work; for they were now being given a share of the privileges of the Company, and with it they must take an equal share in its responsibilities. In conclusion, he was glad to inform Mr. Baker that these visits of the Association were of an educational character; and he ventured to say that each member would go back the better for having been present that afternoon. They were under a debt of gratitude to the management of the Company, to Mr. D. Milne Watson, Mr. Baker, and his two colleagues for giving them the opportunity of the visit.

Mr. D. Winslow, as a late officer of the Gaslight and Coke Company, proposed a hearty vote of thanks to Mr. Baker, Mr. Cossey, and Mr. Cunnold for their kindness in giving up their Saturday afternoon to the members. He was very much impressed with the carburetted water-gas plant. The idea of the coke-hopper feed direct from the conveyor to the generator was excellent.

Mr. W. A. Barnett (Junior Vice-President) seconded the vote, and referred to the orderliness, method, and cleanliness on the works, which must have a moral influence on the character of the workmen. They were able to keep everything clean so much better; they could get about and around the machinery the easier; and learnt to take a pride in their occupation. He fully endorsed what Mr. Liberty had said about co-partnership. He was a servant of a Co-Partnership Company; and he was glad that the Gaslight and Coke Company had adopted the scheme. He entreated those present who had just become co-partners to do all they possibly could. They might not understand it all at the commencement. Many things might seem strange to them; but he advised them to trust implicitly the scheme, and it would return them a hundred fold, to say nothing of the influence that it would have upon them as men.

Mr. H. Austin, a Workman Director of the South Metropolitan Company, in supporting the vote, said this visit would ever be in his mind, on account of the great step forward that had been referred to by Mr. Liberty. It had not been his intention to join in the visit; but he had come this great distance in order that he might join in the congratulations on the scheme that had just been launched. He could speak personally of the blessings of co-partnership. His own Company had paid out no less than £70,000 in dividends to their workmen since the inception of the scheme, and still left their capital intact. While the market value of the stock at the beginning of co-partnership was 103, it was now 122; the workmen reaping the benefit of this rise. He found that for the year ending June last no less than £8862 additional stock had been taken up by the workmen. He asked the men to make a success of this new scheme. He referred to the relief it was to the workman's mind to know that by co-partnership the future was provided against; and his care and anxiety being removed, his mind was free, so that he was able to apply himself the more readily to his work, and give his best thoughts to his employer. He would like to leave this little sum in arithmetic with them. Since the start of co-partnership eighteen years ago, the Company he was connected with had paid in bonuses no less than £427,000, in dividends on stock £70,275, and in interest on men's savings alone £27,000—a total of £524,275. The best thing he had read (not that he had seen) at this works that day was a printed notice posted up that sums of a few shillings would be received from workmen as savings, and 5 per cent. added to them. He was glad to read this, for he himself was a thrifty man, and encouraged thrift.

The proposition having been carried with acclamation,

Mr. Baker, in reply, thanked the Association for their vote to himself and his colleagues, and said the Company were always willing to afford any information in their power. The keen interest of the Junior Association in everything they saw amply repaid them. With regard to their own General Manager, Mr. D. Milne Watson, his motto was "Efficiency;" and he always held out a helping hand to those seeking knowledge, and gave prizes and rewards to men who excelled. He was glad to hear the remarks from Mr. Austin and Mr. Liberty on the co-partnership scheme just launched by their Company. They all intended to put their shoulder to the wheel, to merit the confidence the Directors had reposed in them.

ROUND THE WORLD—AND SOME GAS-WORKS.

By Maurice Graham.

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XX.—FROM FAR EAST TO FAR NORTH.

The s.s. *Mongolia*, one of the largest steamers of the Pacific Mail Steamship Company, was the ship by which the writer covered the 5500 odd miles from Yokohama to San Francisco by way of Honolulu. The absence of fans or punkahs on board made one more than usually conscious of the oppressive heat. It was suggested that as the vessel had been fitted up in the winter time, when snow was on the ground, the question of fans had been overlooked.

HONOLULU.

The Hawaii or Sandwich Islands were at last reached; and they brought to mind the fact that it was on the shores of Kealakekua Bay, Hawaii, that Captain Cook was killed by savages in the year 1779. Honolulu was the port of call. The island and its natives reminded the writer of Samoa and the Samoans. But the old native habits and customs are gone, and the whole populace is quite Americanized. Over 30,000 Japanese also inhabit these islands. The Honolulu district is very hilly, and supplies of water power abound. This accounts for the enormous facilities for obtaining electric light, which is here, there, and everywhere, and is supplied in conjunction with the electric tramway scheme. Consequently, there are only very small gas-works, which, in the circumstances, have not made much headway.

SAN FRANCISCO.

Sighting on Sept. 4, San Francisco, the commercial capital of California, its famous Golden Gate was passed through and its magnificent harbour entered, having an area of between three and four hundred square miles, with only one inlet and outlet. The first glimpse of San Francisco from the sea was neither interesting nor picturesque. Hundreds of tall sky-scraper buildings gave the scene a hard and cold effect. Ideas have travelled from New York and Chicago, and are conspicuous in every part of the scene. An inspection of the city was both pathetic and exhilarating; to see vast areas of *débris* lying just where the buildings fell after the earthquake and fire of April, 1906; and in the midst of it all, magnificent huge buildings erected, and being erected with great energy and enthusiasm. What city has built thirty large hotels in twelve months—hotels that can compare in luxuriousness with any hotels in the world?

After seeing many interesting sights, a move was made to the San Francisco Gas-Works. Unfortunately, Mr. Jones, the Chief Engineer, was absent, and therefore the writer prevailed upon Mr. Barry, his able and energetic Assistant, to conduct him round the works. The first gas-works visited were only about 2 miles from the central district, in a densely populated area. Upon entering, Mr. Barry had a few words of conversation with Mr. Jones's son, who had been solving the problem of laying 1000 feet of 3-inch diameter water-pipe in twelve hours. This had become necessary owing to a sudden shortage of water in the works. Mr. Barry appeared to be quite surprised at the work done; and Mr. Jones, jun., therefore, saw that the energy he had put into this feat had met with the appreciation of his Chief.

A Word of Advice to Juniors.

This may appear trivial to some people; but the writer, always on the alert for any enthusiasm displayed by assistants, was struck with the earnest desire shown to accomplish something more than expected. He was reminded of something Dr. Andrew Carnegie says in one of his books, to the effect that the member of a staff who does something more than he is expected to do during the ordinary day's routine and for the ordinary day's remuneration is sure to bring himself into prominence and rise over the heads of his fellow-workers. The writer can vouch for the truth of this, and would give all young men this advice: "Do more than you are expected to do." In other words, Don't throw down tools or pen or pencil exactly at the time for leaving. Those who are ever ready to leave at or before the office hour, never get the chance of doing some unexpected piece of work which brings them into prominence. Remember that the manager of a works has no defined hours, and may be only too pleased to have your willing assistance. For this a reward is due, and is generally obtained. In any case, it has its own recompense.

The Gas-Works.

Passing forward into the works, the offices were visited, adjacent to which is the exhauster room, with Roots type of plant. Crossing the yard, the ordinary condensers, scrubbers, and stage-floor purifiers, with oxide in use, were noticed. Where are the retort-houses? was the next query. There are none, was the reply, as Jones's improved method of oil-gas distillation is the system in use. Entering another building, a large apparatus, self-contained in a sheet steel casing was seen. This comprised Mr. Jones's special furnace and oil vaporizer and fixer. The whole system was controlled by three or four men, who worked at a switch-board in the centre of the room. [Mr. Barry promised to send the writer photographs and a description of the process adopted; but up to the time of writing they have not been received.] There appears to be an enormous flow of water required in the process of manufacture, and consequently one can imagine the dilemma in the event of the supply running short, as previously mentioned.

There is a heap in the yard of the residual product of the distillation, and it looks like an oily carbon refuse. It is used under the boiler fires for the generation of steam for the works.

Two gasholders suffice for the daily make; the gas being used by large gas-engines which supply the power for producing electric current for lighting and motive purposes. One noticed that the whole of the lighting of the gas-works was done by the electrical department.

Having asked about the trade in gas-fittings, the writer was informed that the Gas Company only made gas and distributed it to their consumers, and did not enter into competition with tradesmen who sold gas appliances.

The whole method of distribution is on the high-pressure system, from 50 lbs. to 60 lbs. per square inch. There are no district governors anywhere; all householders having to reduce the pressure themselves by means of house-governors. It appeared that the consumers liked plenty of pressure.

The Economy of High-Pressure Distribution.

It will be understood that gas-mains under these conditions are comparatively small in area, and thus an enormous capital expenditure is saved. Why do not European gas engineers go further into this question of general high-pressure distribution, when they have to a large extent the problems already worked out for them by the Americans? Why should thousands of pounds worth of capital be sunk on cast-iron pipes every year in the earth? Consider the enormous cost of excavation alone for 30-inch, 48 inch, and 60-inch diameter pipes, merely to convey gas at a pressure of a few inches of water. Such capital expenditure could be reduced by the placing of a few governors. Directors and others should certainly send their gas engineers to the United States for a tour through the various gas-works, not for the purpose of seeing whether the American works are as substantially built as the British, but to see the economical methods adopted to arrive at the same results at half the cost. The general construction of the buildings in American gas-works is a secondary consideration; the first and foremost being the small capital expenditure involved.

After this first visit was completed, Mr. Barry kindly suggested a visit to their other gas station. Arriving there, two more Jones oil carbonizing machines were seen in operation, similar to those already mentioned. What, however, was novel to the writer in these works were the purifiers. They were composed of circular wooden tanks, about 10 feet deep and 20 feet in diameter, made of 3-inch timbers and strengthened with steel belts. The tops were flat, and had two or three good-sized openings for filling and emptying. There had been no trouble at all from leakage. Occasionally, though, the hose water pipe was turned upon the outsides of the vessels, so as to keep them perfectly tight.

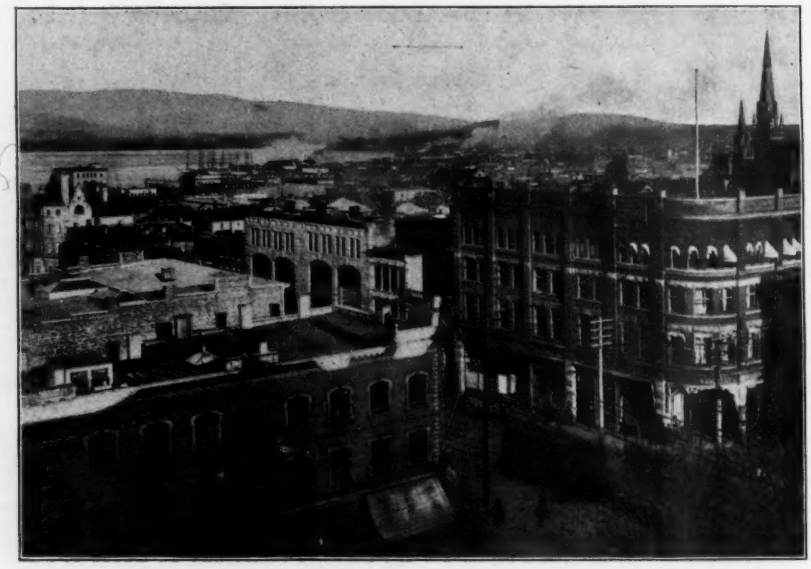
The engine-house, which included the exhausters, pumps, and compressors, was exceedingly interesting, and one could here see the gauge registering 55 lbs. per square inch on the gas-main supplying the district. The bulk of the gas, however, is used in two 5000 H.P. gas-engines, which generate the electric current used by the electric tramways and for the lighting of the city. In fact, the gas-works are run as a huge plant for the production of gas for cooking, heating, and for power purposes.

The writer, although unable to go at present into the statistics of these works, must certainly here express his view that many examples set by the head of this undertaking are well worth following, although the style and system of gas production may be entirely different.

FROM U.S.A. TO B.C.

From the Californian city a day's journey was made to the famous Yosemite Valley, with its granite mass, El Capitan, 3300 feet high, and its Bridal Veil Falls of 630 feet, besides innumerable cascades. Thence to Mariposa Park, where are seen the well-known big trees of California, the largest of which is 104 feet in circumference and is 8000 years old. There are over 6000 of this species of tree, and through two of them a stage coach can drive with ease.

Being desirous of seeing the famous Yellowstone Park, Wyoming State, U.S.A., a day and night journey for four days had to be undertaken. *En route*, Portland and its gas-works, in Oregon State, were passed. In the park were seen wild animals in their natural state; interesting thermal springs and geysers, playing to a height of 250 feet; chemical pools of all colours; and the magnificently coloured "Grand Canyon." After driving about 40 miles a day for five-and-a-half days through the park, a train journey of two days brought one to the thriving seaport town of Seattle, in Washington State. Here the Municipality were cutting down a complete hill, 200 feet high, which prevented the making of level streets in the city. The operations seen by the writer consisted



Photograph No. 171.—General View of Vancouver, British Columbia.

in playing water from four nozzles of 6 inches diameter upon the earthwork at a pressure of 90 lbs. per square inch. This undermined the surface, the earth fell in, and was washed away in streams to the harbour. Over 1000 cubic yards per day were thus being got rid of.

Photograph No. 172.—Offices of the Vancouver Gas Company, Limited.

Nine hours from Seattle, on the Canadian Pacific Company's boat, and Vancouver, British Columbia, was reached. The writer was delighted to see a large Union Jack flying from the top of a building in the city, reminding him of his long absence from British territory.

VANCOUVER, BRITISH COLUMBIA.

Vancouver (of which a general view is given in Photograph No. 171) is well laid out, and is a thriving city with enormous prospects. Everybody looks "quite British, you know," and has an air of happiness and prosperity. The general opinion among all classes is that it is a splendid place to settle in, as there is no poverty or nigger-driving. A man is a man in this town. A fair salary for a fair day's work in all professions and trades is the motto here.

Having spent a day or two viewing the sights, a move was made to the gas-works, where Mr. J. C. Moon is Chief Engineer. This gentleman will be remembered as having been in charge of the Middleton Gas-Works, Lancashire, and previously Assistant to Mr. A. A. Johnston, then at the Ilford Gas-Works.

The Vancouver Gas-Works are owned by the Vancouver Gas Company, Limited, which are affiliated to, and are controlled by, the British Columbia Electric Railway Company, Limited, who supply the traction, power, and lighting needs of the city. The Gas Company's offices are shown in Photograph No. 172. The gas-works were established in 1886, but were never encouraged, as the introduction of electric current was the primary object of the controlling Company. But with the rapid increase of population came the demand for gas for cooking purposes; and last year a 46 per cent. increase in consumption was recorded. The writer was informed that over 10,000 people come into the town yearly to reside. The present population is 90,000, and there are 4000 gas consumers at this date [September, 1908]. The area of the gas-works, including the site for gas storage, is 14 acres. Most of the buildings in American gas-works seen by the writer are built of wood; and Vancouver follows suit. Timber is plentiful and good; and there is no need for large outlay of capital on elaboration or bricks and mortar.

The coal used is in appearance like powder, and packs very closely; so that Mr. Moon has doubts as regards its successful carbonization in the vertical retorts described hereafter. This coal is of local extraction and costs 14s. per ton; the price of the next better quality being 20s. per ton.

The principal retort-house, of which there are three (two being old ones), contains four beds of nine through retorts, 14 feet long by 26 in. by 15 in., Ω-shaped. The two smaller houses contain six beds of nines, 9 ft. 6 in. long. All the retorts are horizontal, and are heated by regenerative furnaces.

Vertical Retorts.

In the first or new house there is also a new bed of six vertical retorts, 12 feet long, 24 in. by 14 in. at the top, and enlarged to 27 in. by 17 in. at the bottom, fitted all complete. The retorts are rectangular in section, with rounded corners, and are made up in five lengths, each with rebated joints. The bench, a view of which is given in Photograph No. 173, was built by the Laclede Christy Fire-Clay Product Company, of St. Louis, Missouri (U.S.A.). It was erected, in the nature of an experiment, by Mr. Moon's predecessor, and was not completed when Mr. Moon arrived on the scene. He is doing his best with the plant that he found existing; and the builders of this vertical bed can rest assured that every attention will be given to it. The bed was put into action about the beginning of October, 1908, and at the time of writing [Oct. 27] was working satisfactorily, although better results are anticipated. The charges of coal, which is washed peas and very small, are about 1400 lbs., and take twelve hours to burn off. An arrangement for admitting steam at intervals during carbonization has been fitted up, but no definite figures are yet obtainable of the working results. The coke yielded is greater in quantity than by the horizontal system, and at the

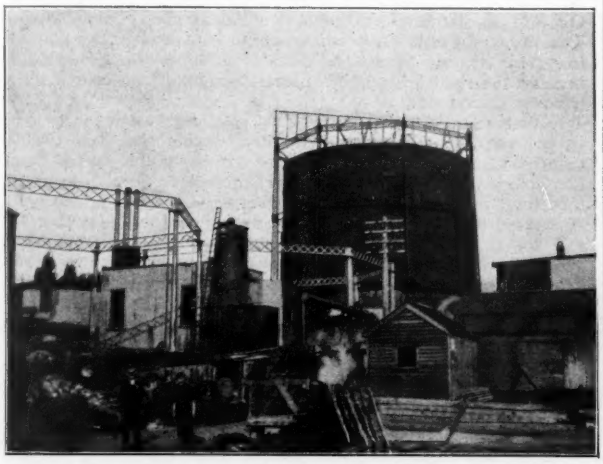
Photograph No. 173.—Bed of Six Vertical Retorts, with Mr. J. C. Moon, Engineer and Manager.

same time is much superior in quality, and it consequently commands a higher price, though there is also a good local market for the ordinary gas-works' coke.

Mr. Moon's idea is that the bench might have been designed so that the coke could have fallen either into truck or slid down an inclined plane into trucks, and thus taken away as quickly and cheaply as possible. At present, the coal is hoisted up by hand by a temporary arrangement, and the coke is taken away by a similarly laborious method. The continual shovelling into barrows for this one bench involves great expense, and, of course, far greater than could be afforded on a larger and more commercial installation.

The Handicap of Novelty.

This is only another instance among many that have occurred during past years of new processes being handicapped by being installed in unsuitable or make-shift manner. When the inclined retorts were introduced between 1889 and 1892, the writer found that gas engineers would insist on cramming the new system into old retort-houses only about high enough for direct-fired horizontal retorts. They begrudged the room for the coal-bunker overhead, so had it fixed at great expense in the roof among the tie-rods. The system in such circumstances was not given a proper chance; and the result was failure. To some extent the same thing has occurred in the earlier experiments with vertical retorts, which were built too near the ground, so that a satisfactory discharge of the coke could not be obtained. It is sound advice to say—build retorts sufficiently high to facilitate the clear withdrawal of the coke without any difficulty. If this is not done, the hot coke accumulates and the mouthpieces may be burnt and damaged. This was considered at one time a drawback to the inclined retort system, but was really a defect in the particular installation and not in the system. When a ground-floor house is adopted, there must be a quick-running hot-coke conveyor to get away the coke without trouble or delay.



Photograph No. 174.—Gasholder Advertisement—"Cook with Gas."

The question of the low cost of carbonizing in all systems relies chiefly upon the coal and coke conveying plants for handling the materials. Their introduction must not be entirely judged by the wear and tear account of such systems, as that account alone will readily be repaid by the general *morale* of the various gangs of stokers. Take two gas-works, one with complete machinery and one without. In the former case, the gas company pay a wear and tear account, and obtain a general business-like system throughout the works, and care for no man. In the other, the stoker has to be coaxed and humoured with libraries and other social conveniences, and an artificial atmosphere of good-fellowship has to be created, which costs money far and above the wear and tear account of the engineer who manages his gas-works on true business lines. The writer having seen both sides of the hedge, so to speak, feels he can express his views emphatically and without fear or favour.

To continue the visit round the works: A battery of atmospheric condensers, two Waller exhausters, a Livesey washer, a tower scrubber and one Holmes washer-scrubber, and five purifiers filled with oxide, made on the works, complete the manufacturing apparatus.

There are three gasholders; and these are seen in Photograph No. 174. The biggest one, it will be noticed, is also used for advertising purposes, and bears on its top the sound advice—"Cook with Gas." In addition to these holders, there is a new one in a steel tank upon a separate site, which is being erected by Messrs. C. & W. Walker's men. Everything was going on satisfactorily, and a speedy finish of the work was anticipated before the heavy winter set in. When completed, the storage capacity will equal one day's supply of gas, or 350,000 cubic feet.

An Economical Company's water-gas plant, of a capacity of 500,000 cubic feet per day, is in every-day use, and takes its share in producing the 100 million cubic feet of gas made in the year.

At present there is no sulphate of ammonia apparatus, as there is no demand for the salt. Tar, however, has a good sale for general purposes; most of it being barrelled and taken away by barges.

The total length of mains amounts to nearly 50 miles; and although there are no high-pressure mains at present, a scheme for them is under consideration. No trouble with naphthalene is experienced; and no enrichment need be used to maintain the 15½-candle power gas that is sent out. Its price is 8s. per 1000 cubic feet, with 1s. discount for prompt payment.

Both the gas and electric works being owned by one Company, there is no competition allowed between the two illuminants. Gas-engines are not introduced, owing to the enormous electrical horse-power generated from natural water sources at the disposal of the Company, who find the sale of electric motors more to their benefit. The writer, however, noticed, that several suction-gas plants were being erected in the city by outside engineering firms. There is, also, a limit to the power to be developed from the water supplies, and therefore with an increase of population, there will certainly follow an extension of the gas-works for power purposes.

Cooking by gas is now largely advertised (as has already been noticed on the gasholder), and Mr. Moon said he had a scheme in hand for canvassing and pushing the sale of cookers and fires during the coming season, as the public were catching on to their cleanliness, convenience, and efficiency in their homes.

Disgraceful Public Lighting.

The electric light is responsible for the public lighting of Vancouver; no gas being used for it. Particular mention must be made of the very bad lighting of the city. This does not in any way reflect any discredit upon Mr. Moon, but it does upon the city authorities, who allow this beautiful and rapidly growing town to be so neglected that it very largely relies upon the shops for lighting the public streets. The lighting contract is let to the British Columbia Electric Railway Company, Limited, who control (as previously stated) the tramways and the lighting, and who bought out the Gas Company. They can, therefore, limit the amount of gas sold, and throttle the introduction of gas. It is a different state of affairs to that in Perth, West Australia, Hobart, Tasmania, and San Francisco, where the electric current is generated by steam or gas and only to the extent that is required; whereas in Vancouver electricity is supplied from a water-fall and goes to waste if not sold.

The writer, when there, in September, counted only seven small arc lamps from the Canadian Pacific Railway Station to the Vancouver Hotel, a distance of half-a-mile along a main thoroughfare—Granville Street. The lighting (or rather absence of lighting) is disgraceful, and must be apparent to anyone who has seen other towns and cities well lighted by means of gas. Not only one, but scores of streets in Vancouver are almost in darkness. Surely the aldermen owe a duty in this matter to the citizens, and should give their immediate and careful attention to the proper lighting of the thoroughfares by high-pressure incandescent gas. This can readily be accomplished, and would give satisfaction to everyone. In this matter, the writer has not in any way consulted Mr. Moon, but is expressing views resulting from his experiences of travel round the world, and can safely say that Vancouver is the worst lighted city for its size and importance in the world. The city authorities should be aware that the lighting of the main and side streets of a city is one of the best advertisements a town can have. If they are ignorant of these matters of corporation management, they should appoint an expert to visit the principal cities of Europe and England to report upon and profit by their public lighting.

As regards the future prospects of Vancouver, there is no doubt that within a few years, this city will be one of the greatest on the Western Coast. It has a splendid train service; being the terminus of the Canadian Pacific Railway. It is also the chief Canadian port to Japan, China, and the Orient, and to Alaska and Dawson City. The gas-works will undoubtedly share in this development; and before very long it will be necessary to build a completely new works, as those on the present site are rather cramped. Indeed, Mr. Moon is considering and working out his scheme, and intends investigating the oil-gas methods adopted in California and along the west coast of America.

VICTORIA, BRITISH COLUMBIA.

The City of Victoria is the capital of British Columbia, and contains the administrative buildings, the Parliament House, and some beautifully laid-out streets. It can be described shortly as an entirely residential city, populated chiefly by the retired and leisured classes. The writer was struck with the strong English atmosphere permeating the place, which reminded him of Bath or Cheltenham. The climate is very mild the whole year round, and consequently attracts people from less favoured or wintry climates.

The Victoria Gas Company was founded in 1862, and had a gradual increase in gas consumption until the British Columbia Electric Railway Company installed themselves in the city. This is the same Company (previously mentioned) which runs the lighting and power of Vancouver. A rate-war was then commenced by the Electric Company offering to supply gas consumers with electric light at one-half the cost of gas. The Gas Company entered the field to fight the new comer; but the Gas Company's Directors showed their sound judgment by realizing that they were fighting a Company with unlimited capital, and

Photograph No. 175.—General View of Victoria (British Columbia) Gas-Works.

wisely sold their concern to the new comer. Since that time, the sale of gas has been only for heaters and cookers; no lighting by gas being pushed. The Electric Company supply all lighting and power in the city, and run the electric cars.

During the writer's visit, advertisements appeared in the local papers stating that the Electric Company were unable to supply sufficient current, and therefore all lighting would be shut off at eleven p.m., and the tramcar service would be curtailed to meet the deficiency. This was all owing to the fact that the British Columbia Electric Company are dependent upon the rainfall for their power; and as the rainfall had been very small during the previous few months, the town had to suffer. Thus injustice is done through the Electric Company holding both the gas and electricity plants, and by their not providing sufficient gas or steam power to generate the current required. The gas-works are absolutely starved, and the citizens cannot get the gas supply to which they are rightly entitled. Such a state of affairs certainly reflects upon the City Fathers, who are the trustees and guardians of the city. The policy of allowing the same hands to hold both the gas and electric light works should be put a stop to, unless both systems receive equal consideration, so that the public can choose whichever they wish. The Victorian parliamentary authorities should see that the populace receive what is their due, as the clauses in the franchise or monopoly cannot surely allow of the sale of electric light to the gradual and compulsory diminution of the sale of gas. These facts the writer learnt from the lips of public men in the town.

Under these circumstances, a visit to the gas-works was of interest. An interview with Mr. Fred. H. Hewlings, the General Superintendent, who has now been in the Company's employ for 24 years, furnished a few particulars as to the gas plant, which is under the engineering control of Mr. J. C. Moon, of Vancouver. The works, of which a general view is given in Photograph No. 175, are situated on the water edge, with every accommodation for unloading scows or barges of coal of a capacity of about 280 tons each. The area of the works is about four acres; there being no anticipated increase in site for many years to come, as the land is quite sufficient for any reconstruction scheme based on heating and cooking returns only. The coal used is known as Ladysmith Extension Mine, and is washed peas of a fine and small description. Its cost is 14s. per ton delivered at the works, including the cost of unloading, which is 1s. per ton. All coal is stored under cover, the stores containing 800 tons.

There is one bench of retorts, comprising forty single retorts, 22 in. by 15 in., Ω-shaped, 9 feet long, all worked by hand-labour, which is paid at the rate of 75 dollars (or £15) per month, or £3 15s. per week of seven days, with eight-hour shifts. The retorts are heated on the shallow regenerative system; and the heats seen by the writer were exceptionally good. The coke is of excellent quality, and fetches 20s. per ton. Firebricks, in Victoria, cost about £8 per 1000, and common bricks 48s. per 1000; while cast-iron pipes at present [November] run about £10 per ton. The freight on all goods from England to Victoria is about 30s. per ton, and there is a 25 per cent. duty on the price of the article; so that the cost of British goods is about 50 per cent. greater than at home.

The condensers are of the annular type, and are illustrated in Photograph No. 176. They, with the exhausters and two scrubbers, form the best part of the works. In a solidly built house stand the four purifiers, 10 feet by 12 feet, with water lutes, and filled with artificial or "works' made" oxide. After a cylindrical station meter come the gasholders (Photograph No. 175) containing 266,000 cubic feet, or over a twenty-four hour make of gas. Then a Connelly automatic governor regulates the pressure in the town to 3 inches.

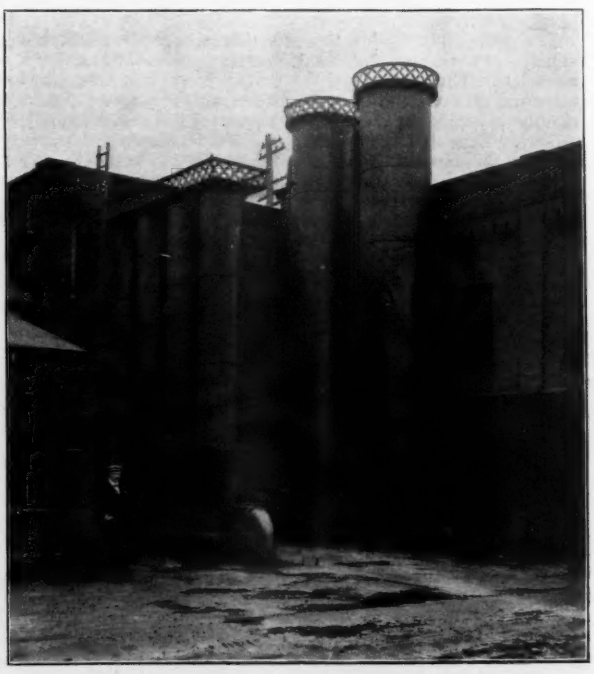
The annual make of gas is about 40 million cubic feet. There is neither water-gas nor any bye-product plant; the liquor running to waste. Tar commands a fair price at 5d. per gallon, and is in great demand. The total length of mains is 27 miles, and there is no trouble with naphthalene. The meters used are dry, and a meter-rent of 1s. per month is charged. Slot-meters are installed, and are regulated to supply gas at the rate of 6s. per 1000 cubic feet, including meter-rent. There is free piping from the gas-main to the meter.

All Welsbach lamps in the city belong to the Gas Company; and where absolutely insisted upon, in preference to the electric light, by store or shop keepers, they are put in free of cost and maintained with mantles at a cost of 2½d. per burner per month. Out of a population of 35,000, there are about 2000 gas consumers. The price of gas is 7s. per 1000 cubic feet for lighting and 4s. to 5s. for heating purposes. Nothing is done with gas-engines, because the British Columbia Electric Company push their electric motors instead.

Notwithstanding all these drawbacks, there was an increase of 35 per cent. in the gas consumption during the past twelve months, which distinctly proves that it is impossible for the Electric Company to try to bury the Gas Company. Something must, therefore, be done by the city authorities so as to prevent the attempted throttling of the sale of gas when there is such a big call for it by the public. The writer confesses that he left Victoria with memories of disgust as regards the way in which gas lighting is ignored by the authorities who govern the city, which is the capital of Western Canada.

TO KLONDIKE AND THE FAR NORTH.

Before leaving Western Canada, it was impressed upon the writer that he should seize the unique opportunity of a trip to Skaguay (Alaska), Klondike, and Dawson City (Yukon). This meant covering over 3000 miles in the short space of one month and travelling to a latitude of 63° North. The passage was at first booked on the s.s. *Humbolt*, but a change at the last moment



Photograph No. 176.—Annular Condensers, Victoria Gas-Works.

was made to the Canadian Pacific Railway Company's steamer. This proved to be a fortunate change, for the writer, on reaching Prince Rupert, the new port of the Grand Trunk Pacific Line, learned that the s.s. *Humbolt* had been shipwrecked when two days out from Seattle.

The voyage from Vancouver was magnificent, passing through land-locked channels almost the whole way to Skaguay. At some ports of call, advantage was taken of the opportunity of inspecting salmon canning factories; the salmon being caught there by Japanese and canned by Chinese.

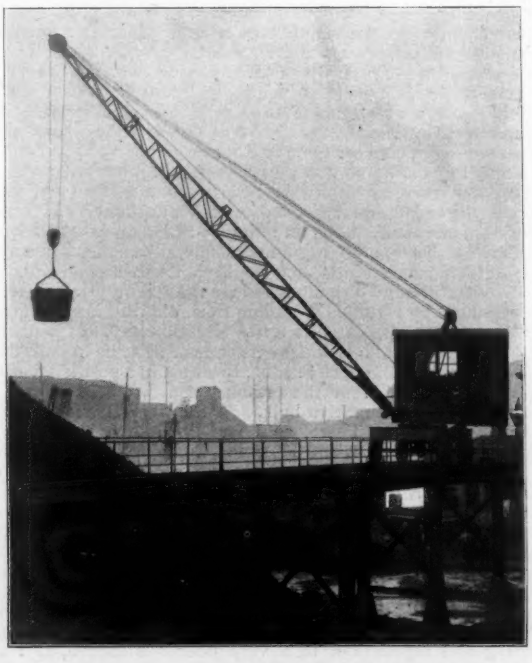
Skaguay, the American port of the Yukon Territory, was reached. From there to White Horse Pass was the fateful trail of the 1897 "gold rush." Now the narrow gauge railway winds round the valleys and creeks, and gradually mounts until the summit is reached. In summer, the climate is simply perfect, and daylight lasts 22 hours. At White Horse, the railway ends, and the river steamers start their 500-mile journey to Dawson City. They pass through some of the grandest mountain scenery it is possible to imagine. Klondike, on the river of the same name, comes first into view, and then the town or city of Dawson, both being on the right bank of Yukon River. There the "placer" mining, sluicing, and dredging methods adopted were inspected, and various creeks and gulches visited. All the buildings are of wood, and are in a dilapidated state, and the roads are in the worst possible condition. The prices of all goods are fabulous., and the accommodation execrable.

Owing to the mountainous country, there is plenty of water power, and it is turned to account for generating electric current for power and lighting. Every town or village above 500 inhabitants has these conveniences on the coast of British Columbia, in Alaska, and the gold mining districts. Oil is used in all the shacks or log cabins on the rivers.

The writer was lucky in catching the last returning steamer before the freezing of the River Yukon, which prevents further navigation until it opens up again in April. So the return voyage to Vancouver was made, and one of the most interesting tours experienced came to a close.

ELECTRIC LOCOMOTIVE JIB-CRANE FOR THE BRISTOL GAS-WORKS.

The accompanying photograph illustrates an interesting type of electric locomotive jib-crane running on a raised gantry which has recently been introduced at the Bristol Gas Company's works. This crane—which was constructed by Messrs. Applebys Limited, of London, Leicester, and Glasgow, to the design and specification of Mr. D. Irving, the Gas Company's Engineer—is fitted with lifting, lowering, slewing, derricking, dumping, and travelling motions, all operated from a single motor.



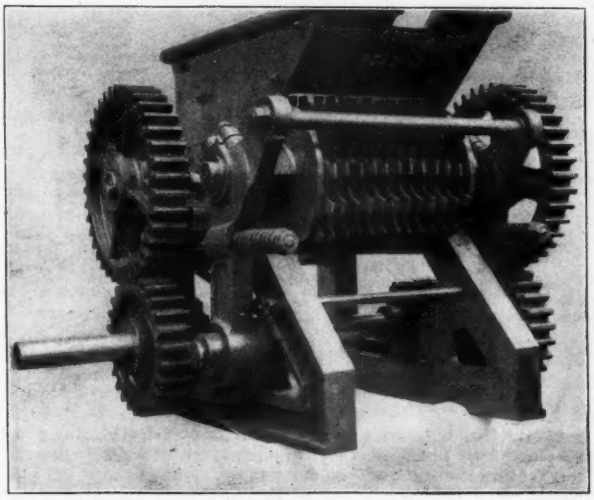
Electric Locomotive Jib-Crane at the Bristol Gas-Works.

The crane is capable of handling a skip containing 15 cwt. of coke at a maximum radius of 50 feet free on track, with the jib in any position relative thereto. Each skip is constructed of mild steel suitably stiffened, and provided with runner wheels underneath, and so arranged that a full skip may be easily moved by a single attendant. A Temperley automatic dumping fall-block is also provided; and this enables the driver to dump the coke at any desired position, and obviates the necessity of having an additional man on the heap to upset the skip. The coke from four retort-houses, each carbonizing 100 tons of coal per diem, is conveyed direct from the retorts, cooled, screened, and delivered into skips, and the coke stacked, with a minimum of breakage, in any part of the yard as required.

This combination of crane and raised gantry is more specially adapted for dealing with coal, minerals, &c., in bulk, and for loading and discharging vessels; and, owing to the large range of action of the machine, a considerable saving in operating cost is effected.

A PATENT COKE-CUTTER.

In the course of the article which appeared in our issue of the 5th inst. (p. 38) on a coke cutting, screening, and storage plant recently erected at Manchester by the Chain Belt Engineering Company, of Derby, brief reference was made to the cutter, of which we learn that Messrs. Robert Cort and Son, Limited, of Reading, were the manufacturers. The machine installed at Manchester was specially designed for that plant; and we reproduce herewith an illustration of it.



Cort's Patent Coke-Cutter.

The cutting action, it may be explained, is produced by two sets of circular serrated steel cutters, revolving at different speeds. The makers point out that the difference between their patent coke machine and the ordinary coke-breaker is that the former cuts the coke absolutely uniform in size. It can be adjusted to cut various sizes; and the breeze does not exceed 5 or 6 per cent., while the dust is practically *nil*. With the coke-breaker, they say, the coke is crushed, and is not uniform in size; and it is rarely possible to obtain less than 25 to 30 per cent. of breeze, as well as a great deal of dust.

THE NEW PUMPING-ENGINE AT WIDNES.

Excellent Result of the Efficiency Test.

In the "JOURNAL" for the 21st of July last, we recorded the starting of a new pumping-engine at Stocks Well, in connection with the water supply of Widnes. The engine, which has been named the "Henry Sutton Timmis," after the Chairman of the Gas and Water Committee of the Corporation, is of the triple-expansion horizontal differential condensing type, with three cylinders, 20, 38, and 60 inches diameter respectively, two 20-inch open lift bucket-pumps, and a 20-inch double-acting force-pump —all with 6-feet stroke. It was supplied by Messrs. Hathorn, Davey, and Co. The specified duty of the engine was that it should be capable of raising 3 million gallons of water per diem from a depth in boreholes of 250 feet to the surface of the ground, and forcing it to the reservoirs at a distance of two miles, and a height above the ground line at Stocks Well of 150 feet, with an allowance of 100 feet to cover friction in the rising main and subsequent additional altitude that might at any time be required on Pex Hill—thus making a total lift of 500 feet on the two pumps. The guarantee of the Contractors, under the foregoing conditions, was a duty of not less than 128 million foot-pounds of water lifted for every hundredweight of coal, or 1008 lbs. of steam on an evaporate duty of 9 lbs. of water per pound of coal; all the steam which passed to the engine, both to the cylinders and the steam-jackets, being taken in the result. The penalty of the contract was to be £40 per million for each complete million the duty fell

below the specified 128 millions, while a premium of £20 was offered for each completed million by which the duty should exceed the amount specified. The final trial of the engine was made on the 5th of November; and the following is the report thereon of Mr. Isaac Carr, M.Inst.C.E., the Gas and Water Engineer of the Corporation.

EFFICIENCY TEST OF THE STOCKS WELL ENGINE.

The engine is provided with a surface condenser, into which all the steam from the cylinders is condensed. The condensed steam from the steam-jackets is caught in steam-traps. The whole of the water was caught in vessels standing on carefully adjusted weighing-machines; and thus the whole of the water passing from the engine was ascertained during the period of the test. A number of preliminary tests were made under varying conditions of load of three, six, nine, and twelve hours' duration. The final test was of twelve hours' duration (9.30 a.m. to 9.30 p.m.), with the engine working under a constant head of practically 500 feet. The following are the results:—

Observations.

Boiler pressure	175·5 lbs.
Vacuum	28·4 in.
Superheat at engine stop-valve	81·5 Fahr.
Temperature of water from condensers	76·8 ,,
Pumps—	
Height of lift, borehole	151·56 feet
,, ,, ,, force-pump	347·27 ,,
Total lift	498·80 ,,
Quantity per stroke, borehole	162·70 galls.
,, ,, force-pump	158·50 ,,
Strokes made (corrected)	12,340
Average number of strokes per minute	17·138
Water pumped into reservoirs in twelve hours	1,957,000 galls.
,, ,, ,, rate per diem	3,914,000 ,,
Total feed water collected from the condenser and steam-jackets in twelve hours	68,016 lbs.

Results.

Indicated horse power per hour	160·37 H.P.C.
	172·87 I.P.C.
	157·76 L.P.C.
Total	491·00 I.H.P.
Pump horse power per hour	410·66
Duty of 112 lbs. of coal, or 1008 lbs. of steam, in million foot-pounds	144,616,000
Steam per indicated horse power per hour	11·42 lbs.
,, ,, pump horse power per hour	13·80 ,,
Coal per indicated horse power per hour	1·26 ,,
,, ,, pump horse power per hour	1·53 ,,
Mechanical efficiency	83·63 p.c.

On the foregoing results, the Contractors, having exceeded the specified duty by 16 completed millions, are entitled, under the terms of the contract, at £20 per million, to a sum of £320 premium. The contract speed of the engine is 13¼ strokes per minute, to deliver 3 million gallons per diem into the reservoirs. The actual average speed during the trial was 17·138 strokes per minute, at which speed water was delivered into the reservoirs at the rate of 3,914,000 gallons per diem, which is (say) 900,000 per diem, or 30 per cent. in excess of the contract quantity.

It will be noticed that the average readings of the borehole gauge showed the water level in the earth to be 151 feet below the ground level; leaving practically 100 feet of water on the pumps. This fact is a highly important consideration when viewed in conjunction with that of the excess capacity of the pumps, as it is further valuable testimony to the abundance of the Stocks Well source of supply; for, enormous as the capacity of the pumps has been proved to be, it appears to be established that the source of water supply is more than equal thereto.

The additional pumping plant not only forms an abundant reserve of pumping power, which makes the supply of water to the town and district additionally secure, and at the same time provides a greater surplus to meet increased consumption, but there is the additional advantage in the saving of the coal bill. Since the new engine started in May last, up to date—a period short of six months—there has been a decrease in the quantity of coal used, compared with the corresponding period of last year, of over 1200 tons. As the engine has only been in actual work about three-fourths of this period, it is now estimated that the probable reduction in annual consumption will be about 3000 tons, and a consequent saving on the coal bill, at the current contract price, of £1387. This sum is about £400 in excess of the amount required to pay interest and sinking fund on the total capital expended on the new works. In addition to the saving in coal, with Netherley for the most part at a standstill, there will be a further saving in wages and maintenance charges of probably £250 per annum; thus making a total reduction in the annual cost of working estimated at £1637.

Fine v. Coarse Portland Cement.—At the Students' meeting held at the Institution of Civil Engineers on the 8th inst., Mr. K. W. S. Mitchell read a paper on "Portland Cement: The Effect of Fineness with Aëration on its Strength." An interesting point brought out by the author of the paper was the large increase in surface that had been covered by a fixed quantity of finely-ground cement over that covered by a like quantity of coarsely ground; thus enabling a larger aggregate area to be covered by the first-named product.

YORKSHIRE JUNIOR GAS ASSOCIATION.

The first Meeting of the year was held last Saturday at the Bradford Technical College, with Mr. S. W. SHEPHERD, the Vice-President, in the chair. The opening item was a characteristic, practical Presidential Address by Mr. H. Butterfield, Manager of the Silsden Gas-Works, which was illustrated by drawings, models, and samples of the various things to which reference was made.

PRESIDENTIAL ADDRESS.

Gentlemen,—This afternoon I propose to speak for a short time chiefly upon what, in my opinion, is the most important subject in connection with our industry—*i.e.*, carbonization. To be up to date, one is expected to say that the old saying "that profits (or rather balance-sheets) are made in the retort-house" no longer holds good; but I am one of those who still abides by the old saying. I thoroughly believe that profits or balance-sheets are still made in the retort-house; and I would venture a little further and say that a good sum of money that is made in the retort-house is squandered somewhat recklessly in the streets or distribution department. In my opinion, the fixing of free cookers, or cookers at very small rentals, is hardly a business-like transaction; and I know of one or two places where the simple hire of cookers is a dead loss—the rents accruing not being sufficient to pay the repairs and maintenance charges, not to mention the capital charges.

A short paragraph which appeared in the "Gas World" a few weeks ago may be of interest at this point. The Chairman of a company said: "It has to be borne in mind that the rent of the stoves did not meet the repayment of loans by a considerable sum." Is this business? What does this statement mean? Simply that the lighting consumer has to make up the deficiency. Again, the Technical Press in connection with our industry is often criticizing corporate bodies for absorbing the gas profits in aid of the rates, contending that the gas consumer is paying above his fair proportion of the rates by reason of the corporate body robbing him of his gas profits to pay rates, instead of lowering the price of gas. It is a fact, and ought to be altered. But the corporations are only doing what the gas people are doing daily—*i.e.*, making one department pay for another. For example, a man gets a cooker, costing (say) £5, either free or at a very low rental, while another man uses gas extensively for lighting his business premises and does not require a cooker. If a cooker is purchased and practically given away, the money must come from somewhere. Say the business man pays £100 a year for gas used for lighting purposes, he will be a good paying customer, because probably only one service and one meter are being used. Therefore his repairs and maintenance account will be small (in proportion) when compared with the man with the cooker with an average account of from £3 to £4 per year with a service, meter, and cooker. Who pays the largest share towards the £5 cooker? The man who gets no benefit from it—the lighting consumer. The only solution to the foregoing is, in my opinion, to adopt the system of hire-purchase—a system which offers almost equal facilities to the simple-hire system. In my experience, a hire-purchase customer is a permanent one, while the simple-hire customer is a very erratic and expensive one. To prove my statement, I would just ask you to look into the cooker store of any large town where simple-hire has been adopted for some time, and the present time of the year is the time to find large stocks of second-hand cookers lying idle.

I may say I adopted hire-purchase myself three years ago, and I have not had a single cooker returned to the store yet, and, of course, our repair and maintenance cooker account is *nil*. Therefore I am of opinion that a lot of the so-called up-to-date business methods of distribution are not commercially sound, and a better way of increasing consumption would be to devote more attention to manufacture and ultimately reduce the selling price, instead of increasing it by continually adding fresh distribution charges.

When one is appointed to a new situation (say, as a manager), he must set out for himself a programme of what he intends doing. When I was appointed to Silsden, I was not in a position to obtain much information from the ordinary sources, because gas had been previously bought in bulk, and the works I was to manage were entirely new. Therefore I had no data to work upon as regards carbonization, and I decided, among other things, that I would endeavour to obtain a large make of gas per ton of coal carbonized. Now the first essential to a good make of gas per ton of coal carbonized is for the retorts to be well and evenly heated. To obtain good, even heats, a well-constructed regenerator and furnace, well designed for the amount of heat required in the setting, is required; a good setting of retorts capable of abstracting as much heat as possible from the furnace gases before they enter the regenerator; and, above all, good workmanship. The workmanship, if indifferent, reduces the best-designed setting and regenerator to a very poor one indeed, as I shall endeavour to show you this afternoon.

The retort-settings at Silsden are on the regenerator principle, and are as simple as possible; the furnace being placed in the centre projecting from the setting about 2 ft. 6 in.—the secondary-air passages on each side of the furnace and the waste-gas flues on the outside. The regenerator is 8 feet deep, with seven secondary-air and waste-gas flues on each side of the furnace. That the setting is a good one I have no doubt—that is, if properly erected and good workmanship put into it; but such was not the

case when the settings were first erected, I regret to say. When the settings were first lighted up, which occupied about a month, splendid heats were obtained for a time, but quite suddenly they dropped, as did also the make of gas per mouthpiece—from 6000 to 4000 cubic feet. Of course, I suspected short-circuiting. As this was indeed a serious outlook for new settings, I set about to find the fault; and this is what I did. That the settings would come to grief so soon had evidently not been bargained for, as sight-holes had not been left in the secondary-air flues; so I had these broken out and sight-boxes inserted. Then I obtained a 12-foot length of ½-inch wrought-iron tubing, being slightly longer than the flues, connected this to a gas supply with rubber tubing, and lighted it, having a flame about 18 inches long. This I inserted into the secondary-air flue, with the hope that if short-circuiting was taking place, the hole in the brickwork that allowed the secondary-air to pass into the waste-gas flue would also do the same for the flame, and enable me to locate the fault.

Now the partition wall between the secondary-air and waste-gas flues was built of ordinary 9 in. by 4½ in. by 3 in. fire-bricks; and each flue being 11½ inches high and 11 feet long, it will readily be understood that this wall was well adapted for short-circuiting—there being about 80 feet run of fire-clay joints in each flue. Such I found was the case, every few inches that the flame was pushed along the flue, some fault was revealed. These were caulked as we went along with an ordinary caulking tool; but when we got to the back wall, the whole flame, 18 inches long, was drawn from the secondary-air flue to the waste-gas flue. We could easily see what had happened—the partition wall had been run butt against the outer wall of the bench, and was not tied in any way. The back wall, having bulged out with the heat, left the partition wall, revealing a passage between the two flues of about ½-inch from the top to the bottom of the regenerator. These short-circuits could not be repaired satisfactorily with the caulking tool; so each bed was dropped in turn, the back wall taken out, and the flues tied in. The beds were then relighted; but the heats could not be got so good as at first.

About this time a paper was read to the Yorkshire Junior Association by Mr. J. F. Smith (then of Halifax), on gaseous firing, which attracted considerable attention in gas circles at the time. This paper was the very thing I wanted, and I carefully studied it, especially the part dealing with the practical working. In the course of the paper, several methods of adjusting the secondary and primary air-slides were given; but, to quote Mr. Smith's own words, "the best method is, of course, by analyses of the waste-gases themselves." After trying all the practical methods suggested by Mr. Smith with varying success, I eventually decided to invest about £3 in an Orsat apparatus, with three pipettes for the absorption of CO, CO_2 and O. I made up my reagents from Mr. Smith's paper, and commenced operations. I simply drilled a hole in the top sight-plug, and took my sample; but, to my disgust, I could not get more than 4 per cent. of CO_2. I altered my air-slides daily; but still the results were practically the same—4 or 4·5 per cent. of CO_2 being the best I could obtain. After testing about eight days in this style, it dawned upon me that if I took a pipe (say) about 4 or 5 feet into the flue, I might get better results. I therefore put in a 4½-feet length of ½-inch iron tubing and again took samples, and found about 15 per cent. of CO_2 and 6 per cent. of CO, which showed that the bed was either short of secondary air or too much primary was being admitted to the furnace. But as the heat in the setting was not satisfactory, I concluded that more secondary air was required. This was put on slowly; and after two or three days' testing the heats improved, and 20 per cent. of CO_2 was obtained in the first flue. I find upon referring to my note-book that it says fire clinkered 6.30 p.m., fire broken 10.30 a.m., tested at 1 p.m.; result of test, 20 per cent. of CO_2, 0·02 per cent. of O, 0·1 per cent. of CO. A test taken three days after, just before breaking fire at 10.30 a.m., showed 18·2 per cent. of CO_2, 1·4 per cent. of O, and 0·0 per cent. of CO. At this time, I was having good heats; and I therefore feel confident, from my own experience, that a few pounds spent in an Orsat apparatus will repay anyone, no matter how small his works. The reagents can easily be made up by anyone having a slight knowledge of chemistry, and the tests may be taken almost by anyone with the exercise of a little care. Do not think that the purchase of an Orsat apparatus is the end of all your troubles, however. I do not make any such claim; but it may be a great help towards obtaining good results if used skilfully and the man using it using his head also.

We struggled on for three years until the settings were getting worn out—seeking faults and repairing them. But in the case of short-circuiting, prevention is better than cure. Eventually, I decided to pull down each bed to the foundation and re-build the same with my own men, and superintend the work myself. This I did; and now we have two beds of our own construction—the only alterations to the structure being that the 9 in. by 4½ in. by 3 in. fire-bricks which formed the partition wall of the regenerator are replaced by a series of tiles, 17 in. by 11½ in. by 4½ in., of my own design, reducing my length of joint per flue from 80 feet to 30 feet, and the tiles being dovetailed into each other makes it very difficult for short-circuiting to take place. We have now good, even heats, which I attribute to the better distribution of the furnace gases from the producer. I had noticed that the heating of the original settings was not even—being much hotter behind than in front. To remedy this, I tried making the nostrils in the producer arch of varying sizes. The original size of the four nostrils was 4 inches square. These I altered, starting from the back. The back one I made 4 in. by 3½ in., the second 4 in. by 3¾ in., the third 4 in. by 4 in., and the front one 4 in. by 5 in.; the area in the aggregate being very similar. The result justified the alteration; but although the heats are more even, it is doubtful whether it pays to bring the heat to the front, as we have had considerably more stopped pipes than usual, and these mean loss of gas.

Another feature of the setting is the introduction into the furnace of an arch to support the superstructure while the brickwork is being taken out prior to relining the furnace. The setting is very effective and very simple, and from my experience simplicity should be the chief aim of every design of new settings. The retorts are 10 feet by 21 in. by 15 in. Ω-shaped. The make of gas from the settings used to be 6000 cubic feet per mouthpiece; but we have had occasion to put these beds on 4 hours and 48 minute charges, owing to temporarily increased demands being made upon the plant during the time of fog, when the make per mouthpiece reached 7500 cubic feet, with a make of 11,000 cubic feet per ton.

There are two more little experiences which I should just like to relate, because I think they will be useful to you. The first is with respect to the use of lead wool as a jointing material. Of the many things which have been invented in connection with mainlaying, none, in my opinion, equals the use of lead wool as a jointing material. All of us are more or less interested in the making of joints, whether employed either inside or outside the works; but to the outside man the use of lead wool appeals most strongly, as anything which does away with the outfit of tools necessary for the old style of mainlaying will, I am sure, be welcome. Under the old style, it is necessary to take a very miscellaneous collection of tools to lay a main, or repair an escape of gas from the main; but with the use of lead wool, this is no longer necessary, a tool-bag conveying all the tools required. Some time ago, I thought I would try lead wool, because I fully appreciated the advantages it offered, providing the joints were good; and as we lay almost all the water-mains along with the gas-mains, I thought an opportunity which presented itself was a favourable one—*i.e.*, the laying of a new street, 50 yards long, with 4-inch water-pipes and 3-inch gas-pipes. The trench was excavated the full length (the street not being in use), and the 4-inch main laid first. The pressure being over 50 lbs. per square inch, we put in each joint 2 lbs. 2 oz. of lead wool, as specified by the Lead Wool Company; and we had not a single bad joint. Seeing this result, I commenced laying the gas-main with 1 lb. 1 oz., or one skein, of lead wool instead of one-and-a-half skeins, or 1 lb. 10 oz., as specified; and again we had no bad joints. The saving in lead is considerable—

Lead Wool.			Cast Lead.	
Lbs.	Oz.		Lbs.	Oz.
2	2	per joint against	4	0 for 4-inch water-main
1	1	" " "	2	12 for 3-inch gas-main
3	3		6	12

There is no doubt, in my mind, that the joints are superior to cast lead. We had 18 joints on each run of pipes; and comparing the cost together I found:

3 lbs. 3 oz. of lead wool × 18 joints = 57 lbs. 6 oz. at 22s. = 11s. 3½d.
6 lbs. 12 oz. of cast lead × 18 joints = 121 lbs. 8 oz. at 16s. = 17s. 4d.

This shows a saving of 6s. 0½d. in a 50-yards length; and in addition to this saving of 34½ per cent., there was no coke required, and no labour spent in attending to the lead melting, and no carting of tools. Against this, the fitter spent rather more time over each joint; therefore the labour charges would be about similar. I might add that, at the time these mains were laid, if we had been using cast lead we should have been rained off, but with lead wool we were able to keep going.

My second experience is with regard to steel tubes. After the lecture at the Leeds University by Mr. Walter Hole, of Leeds, I had occasion to lay a main through some new ground recently tipped, and which was likely to subside considerably within the next few years; and as steel mains could be purchased in 20-feet lengths, I thought it would be an advantage to use them. I therefore ordered sufficient tubes for the job of thickened section; but when they arrived, they looked a very poor affair indeed. The most disappointing part was that the thickened section ran away from the top of the pipe about 1½ inches down the side, which meant that while a service at the socket end of the main was in the thickened section, a service at the spigot end entirely missed the thickened section. In conclusion, a pipe requiring wrapping in tarred canvas to prevent corrosion will hardly do.

THE LIVESEY MEMORIAL.

The CHAIRMAN then called upon Mr. Cranfield to introduce on behalf of the Council the question of opening an Association Fund in connection with the memorial to Sir George Livesey, and to move a resolution.

Mr. W. CRANFIELD said that, while in the past they, as juniors of the North, had, in common with all sections of the gas industry, been accustomed to think with a reverent pride of Sir George Livesey as the virtual head and representative of the industry, and to wonder at his powers and achievements, they had nevertheless only known of him from a distance and in his official capacity. The appreciations and memoirs that had appeared since his death had for the first time to many of them revealed the man himself, and made them the more proud of being associated, even though

in humble capacities, with the same profession. They now knew something of the inherent moral grandeur of the man, and had learned of his strong religious convictions, and of his zeal in philanthropic labours and his princely benefactions. Even more than by his marvellous capacity for handling men and guiding affairs, had they been struck with his personal characteristics. They had perhaps known him in the past mainly as a great fighter, a vigilant defender of gas interests, a strong antagonist of Trade Unions, and a far-sighted industrial statesman. Now the curtain had been lifted a little, and they saw also his unselfishness, the august simplicity of his life, and his invariable setting of duty before ease and self-gratification. Something of the grandeur of his aims and the dignity of his life was now known to them; and his example could not be otherwise than a grand inspiration to all their young men. Perhaps even yet they were too near to his work to realize its greatness, and to see how far-reaching were its results. But they were sure that to him was due much of the present security of gas interests, and the magnitude and importance of many of its recent developments. They, as juniors with a share in the future of the industry, were therefore his debtors in no small degree, and would enter perhaps even more fully than his own contemporaries into the fruits of his labours. Time would show increasingly how wise and how firmly based were the foundations he had laid for future developments. But it was fitting that recognition of his life's labours should not be left solely to later times and other men. He was sure, therefore, that as individuals, and especially as an Association, they would desire to have their share in erecting a tribute to the man and his work. He should therefore move that the Association proceed to form a united contribution to the Memorial Fund now being raised, and that the Secretary be instructed to circularize the members requesting their personal contributions and their services in collecting on their works from any who were not members of the Association. Were it simply from such considerations as those he had already referred to, he had no doubt they would be glad to respond to the appeal; but seeing the form that the memorial was intended to take, he felt he had some further strong grounds for appealing to them. Their Association stood in a very special relationship to the Leeds University and its Department of Gas Engineering. They had enjoyed its hospitality in holding all their annual meetings in its buildings. Three of its professors were honorary members with them, and had lectured to them; and they had been privileged to be the first Gas Association to inspect the new laboratories. In very real ways the patronage and friendly assistance of the University and its professors had meant much for them at a time when the Junior Association movement was not as well understood as at present, nor its position so well assured. They, too, were likely to have a further share in its advantages, in being able to get to its courses of special lectures, such as those now being commenced, which he strongly commended to their notice. It would be indeed churlish if they did not now gladly avail themselves of the opportunity of showing their appreciation of what the Leeds University had done for them; and the fact that this newest extension of technical training was due, more than to any other one man, to their greatly-esteemed friend Professor Smithells, both in its inception and its realization, would increase their readiness to make some personal offering to its completion.

When their Association was formed—some six years ago—he was honoured in being chosen as its President for the first two years. In that capacity, and by the kind confidence of his colleagues on the Council, he was enabled to make many of its early arrangements, which had since been adopted as regular parts of its routine. He felt that he might now make public what he had never yet told any one—that one great aim that he had always kept before him in his work for the Yorkshire Junior Gas Association had been to make it a means of bringing the Leeds University and the gas profession into mutual fuller knowledge and closer connection. He ventured to believe that with the invaluable co-operation and support of the Technical Press, these efforts had borne some fruit; and he was sure the members would feel proud that, in some humble degree, their Association had been of assistance in the noteworthy development now approaching consummation. He had every confidence in submitting his resolution for their approval.

Mr. G. W. FLIGG formally seconded the resolution.

Mr. J. H. HILL, in supporting it, said it was not only a right thing to do, but an imperative duty that they should show in one act their appreciation of Sir George Livesey's great services to the profession, and their thankfulness for the kindly good offices of the Leeds professors on their behalf. The establishment of the new Chair of Gas Engineering was a great move, and quite as notable was the concurrent endowment of research scholarships. They were on a flood tide of educational development; and in years to come this might be recognized as having been one of the finest movements in connection with gas matters, and Sir George Livesey's active support of it remembered as one of his great deeds. He was sure their Association had helped on this movement; and now that Leeds was seen to be the inevitable centre for University work in connection with the training of gas engineers, he was most pleased to note the chivalry with which the Southerners had accepted the situation, and were loyally doing their best in securing the endowment of the new professorship. He hoped the Yorkshiremen would rally round it, and avail themselves of its advantages. In the present call for contributions, he trusted the Yorkshire Juniors would be in the van, not so much in the actual money raised as in the heartiness and promptness of their response. He should be proud to think that their eventual contribution represented an offering from every single member, and was thus a true expression of their feelings towards Sir George Livesey's memory and the Leeds University.

The motion was then put and carried unanimously; and, after some further informal discussion, it was agreed that no names be published, but that the total sum be sent as a collective offering from the Association.

The meeting then received the following communication from the HON. SECRETARY (Mr. C. T. B. Roper) concerning some experimental public lighting in Bradford, instituted with a view of enabling the Corporation to make comparisons between the efficiency and cost of up-to-date gas and electric lighting.

NOTES ON EXPERIMENTAL PUBLIC LIGHTING IN BRADFORD.

My remarks on this subject are only intended to be a description of the experiment in connection with public lighting in Bradford. One of our ex-Presidents, Mr. G. W. Fligg, carefully inspected this lighting a little time ago, along with the Dewsbury Lighting Committee; and he expressed the opinion that it was well worth an inspection by our Association. Therefore, when this meeting was arranged to be held in Bradford, the Council decided to include the inspection. Most of the matter has already appeared in the Press; and I wish simply to bring the various details to your notice in the hope that they may prove of interest, if not of actual use, at the present time.

The street lighting of Bradford has been under the control of the Gas Committee of the Corporation for many years. About twelve months ago, the question of improved lighting for some of the principal thoroughfares was brought before the City Council; a feeling having arisen that some improvement was necessary in certain instances, in view of the progress made in some other towns. At the same time it was generally admitted that the lighting of the borough as a whole was very good; Bradford having been the first town in England to go in exclusively for incandescent gas lighting in the streets. A Sub-Committee was appointed, consisting of the Chairmen and Deputy-Chairmen of the Finance, Gas, and Electricity Committees, together with the respective Engineers. The Committee visited London and inspected the lighting of Oxford Street, Whitehall, Victoria Street, and the thoroughfares in the vicinity of Buckingham Palace; and on their return it was decided that a practical experiment should be made in the lighting of one of the principal streets of Bradford. This experiment has now been carried out—one of the chief thoroughfares (Manningham Lane) being selected; and it is causing much discussion locally.

Prior to this experiment, the Gas Department lighted the whole of the city, with the exception of 53 electric arc lamps; the number of incandescent gas-lamps being 12,249, which equals 13,725 burners. The experimental gas lighting has been arranged and carried out under the direct supervision of Mr. Charles Wood (the Gas Engineer and Manager), and is as follows:

In carrying out the experiment, the Gas Department have endeavoured to secure as good and even illumination as possible at moderate cost. High-pressure lighting, although giving twice as much light per foot of gas used, entails considerable outlay on compressing plant, special mains, and maintenance. High-pressure lamps of 1000 or 2000 candle power, which must be 20 or 25 feet high, do not give such an equal distribution of light as a larger number of smaller units placed closer together. Taking our portion of Manningham Lane as from the centre of Burlington Street to the back of Mount Royd—703 yards—we have 75 lamps in 19 spaces between tramway poles. The lamps are of our ordinary pattern, 24 inches diameter, fitted with three new type Bray's burners, which average 3·84 cubic feet of gas per hour; the light being 11 ft. 6 in. above the ground. It was at first intended to place them about 24 yards apart, or three lamps to every two spaces between the tramway poles; but in order to show a fairer comparison with the electric lamps, as well as to arrange the lamps so that alternate ones can be removed after the experiment is completed, we decided to place two to every tramway pole space, or about 19 yards apart.

All the burners are lighted up to eleven p.m., giving, according to our present scale, 1857 hours per annum. At eleven o'clock, one half the lamps are extinguished, and in the others one burner is left until daylight = 1933 hours per annum. The average cost of each lamp erected complete is £4 19s., and the gas used by the 75 lamps per annum is 1,886,500 cubic feet, or 25,153 cubic feet each. The estimated cost of maintenance is £91 2s. 1d., or £1 4s. 3d. per lamp. Last year we received 1s. 5d. per 1000 cubic feet from the Finance Committee for the gas used in the lamps. At this rate, the gas is worth £133 12s. 6d., or £1 15s. 7d. each; bringing the total annual cost to £224 14s. 7d., or £2 19s. 11d. per lamp, or 6s. 4¾d. per yard of street. Taking gas at our selling price of 2s. 1d. less 12½ per cent., the total cost of 75 lamps would be £263 1s., or £3 10s. 1d. per lamp, or 7s. 5¾d. per yard. At 1s. per 1000 cubic feet, the total cost would be £185 8s. 7d., or £2 9s. 5d. each, or 5s. 3¾d. per yard.

It is submitted that in comparing the two systems, the values of both gas and electricity should be taken at the price charged to other lighting consumers, or should be taken at actual cost in both cases. Gas could be profitably supplied at much lower rates in places like Manningham Lane or other main streets than in back streets and in outlying scattered districts where many miles of mains have been laid for lamps only. The Gas Department supply public lamps a distance of 5½ miles from the centre of the city, and our prices charged for gas are averaged over the whole city area. If 37 of the 75 gas-lamps are removed, the annual cost (with gas at 1s. 5d.) will be £123 2s. 3d., or £3 4s. 9d. per lamp, or 3s. 6d. per yard of street; and the street will

then be well lighted. Many of the gas-lamps in the main streets help to light the side streets. In our part of Manningham Lane, every one of the 20 side streets has a lamp at the corner. In the electricity portion, out of 19 side streets six are not illuminated at all by the arc lamps, and additional gas-lamps will be necessary.

The advantages claimed are: The absolute steadiness of the gas-lamps and their superior penetrative power in fog; no shadows across the causeways; no dark places in the roadway; no dangerous wires over the causeways; each lamp is an independent unit; and reliability of gas lighting.

The electrical portion consists of a 707 yards section of the street between the Theatre Royal and Burlington Street. There are installed 18 "Excello" flame arc lamps, each of 2500 reputed candle power, hung on brackets from alternate tram-standards on each side of the road. These lamps are of the Union Electric Company's £5 type, taking 8 amperes with carbons of 8 and 9 mm., 600 mm. The pressure of supply is 460 volts nominal, and nine lamps are run in series; so that those on either side of the road may be cut out after midnight, giving sufficient illumination between that hour and dawn. Each lamp will burn approximately 16 hours without trimming. The brackets carry the arc 5 feet from the centre of the tram-standard and 25 ft. 3 in. above the ground. The lamps can be lowered to the ground for cleaning and attention. The lamps average 40 yards apart; and the full width of the street is 58 feet. The Electricity Committee claim to be able to maintain these lamps at £17 10s. each per annum, or, with alternate lamps extinguished at midnight, at £12 10s. each; this sum including current, carbons, trimmers' wages, and repairs. This is equivalent to about three times the cost of the gas lighting displaced.

As will be noticed, the scheme of gas lighting has been arranged to work out at a slightly lower figure for maintenance than the estimates prepared by the Electricity Department.

The paper was supplemented by comments and local references, and attention was called to the fact that, while calculations of gas costs were given both at the rates actually paid by large consumers—*i.e.*, with maximum discounts—and at that paid by the Corporation for street lighting, the electricity estimates were based on a special low rate such as is not in actual force for any lighting purposes. Calculated to current rates charged, the experimental installation would actually show a charge of £263 for gas as against £338 for electricity. Attention was also called to an illustrated article in "Electrical Industries" for Dec. 9 last. One fears that its culpable unfairness of pictorial presentment, combined with unctuous assurances that the photographs are exactly as taken and in no way touched up, is but too typical of the readiness of many electricity advocates to clutch at any weapon to defend their greatly shaken claims. It will be enough to say that the gas illustration is taken from a considerable distance, at right angles to the line of lamps, shows a residential portion of the street, and gives a large amount of black space in the high sky. The electricity view is taken from a very near position, looking along the lights, and in front of two shops very brilliantly lit by their own powerful electric lights; and, further, the picture is cut off to the top level of high illumination, so as to shut off the dark sky, and is so arranged that what are apparently a series of puddles of large size reflect the glare of the flame arc lamps and so intensify the apparent illumination.

Mr. E. J. SUTCLIFFE moved a vote of thanks to the President for his address and to Mr. Roper for his paper. He praised the President's digression from a common type of address. If the others were unlikely to have Mr. Butterfield's experience of dealing with an entirely new gas-works, they would probably, like him, have to work settings for whose design, and even erection, they had no responsibility. He quoted a recent experience of his in making a joint with lead-wool in a vertical part of a large main where the socket was pointing downwards, rendering the use of melted lead impossible.

Mr. HILL seconded the vote of thanks; saying that he strongly disagreed with a good deal of what Mr. Butterfield had said, but really enjoyed listening to one with such decided convictions and so emphatic a way of expressing his views, as though they admitted of no question.

Electric Inspection Boxes Blown Up at Cardiff.

Some excitement was caused in Cowbridge Road, Cardiff, during the afternoon of last Sunday week, when nine inspection box covers in connection with the Corporation electric cables were, one after another, thrown up into the air as the result of explosions. Happily, however, no serious personal injury was caused; nor, beyond the destruction of the covers, did property sustain any damage. It is stated that, since the preceding Friday, a gang of twenty of the Gas Company's workmen had been engaged in looking for an escape that had been noticed in a 6-inch main near the junction of Llandaff Road and Cowbridge Road. Holes had been made at various points; but the escape, though noticeable to passers-by, had not been located. The consequence was that the ground beneath the roadway had become permeated by gas; and on the Sunday morning a spark from a workman's pick caused a flame to arise in the middle of the road. This was promptly smothered with loose earth; and the work proceeded until one o'clock, when half the gang stopped for dinner. About twenty minutes later, after a loud report, the first manhole cover flew into the air; and the other eight followed in quick succession.

SCOTTISH JUNIOR GAS ASSOCIATION.

EASTERN DISTRICT.

The Eastern District of the Scottish Junior Gas Association held their Second Quarterly Meeting in the Technical Institute in Small's Wynd, Dundee, on Saturday afternoon. In the forenoon, a furious storm of wind and snow raged all over the district, which prevented many members from being present; but, notwithstanding, there was an attendance which was larger than has frequently been experienced at meetings in Edinburgh.

Before the holding of the meeting, a number of the members who had been able to reach Dundee by earlier trains visited the gas-works, over which they were shown. The Association were there two years ago; and there was little new to be seen, except the work which is in progress of erecting a set of new purifiers. There are to be four boxes, 45 ft. by 40 ft., upon the ground level, with a floor for the revivification of oxide above, and a hydraulic jigger by Messrs. Armstrong, Whitworth, and Co., for elevating the material. The cost of the work is estimated at £14,500.

The PRESIDENT (Mr. A. Morton Fyffe) remarked that he thought he was fully justified in saying that the movement for holding some of their meetings outside Edinburgh was a success.

ADDRESS BY MR. A. YUILL.

Mr. A. YUILL, Gas Engineer to the Corporation of Dundee, then delivered an address—remarking that it gave him pleasure to come there to say a few words in explanation of the management of gas-works. In doing so, he would like to deal largely with the commercial spirit of administration. At their meetings a great many of the papers which were presented were of a technical nature. In dealing with questions to some extent outwith that, he hoped to assist them to go into such matters, and to store their minds with what was requisite in the management of works, which he trusted that, ultimately, they might all require to bear a share in. It was considered axiomatic that travel had a tendency to widen the mind. He thought the Junior Associations had adopted a wise policy in visiting works, because they thereby learned a great deal. He did not refer to visits to large works, because he must admit that he had learned as much in seeing small ones.

He did not know of any industry which had suffered or benefited more from the spirit of evolution which had been forced upon them. From the experience he had had, the commercial element bulked largely in contributing to the financial position which some gas undertakings occupied to-day. In Dundee, as they were aware, they had introduced retort-house governors, an apparatus which he looked upon as one of the best that had ever been placed before them. Those who had had experience with them would bear him out in this; and those who had not, he highly recommended to adopt them as soon as possible. A diagram on the wall, from the hydraulic main, with the many heavy fluctuations shown, gave them an idea of the state of matters before the adoption of governors. Another diagram, with the almost straight line, lately taken, showed the state of matters after the introduction of governors, which was about two years ago. They occasionally took the pressure from the ascension-pipe, between the retort and the hydraulic main. On the condensers they had thermometers placed at the inlet and the outlet. They had, in Dundee, five ranges of condensers. One thermometer sufficed on the inlet, because the inlets were common to all; but as some of the condensers might be doing less work than others, on account of a partial choke, it was advisable to have a thermometer on each set of condensers. A daily record of the temperatures, at the outlet specially, was thus obtained and kept. In recent times, great advances had been made in exhauster plant, with reference to the governing. When they had retort-house governors, it was desirable that they should have a stated pull, especially at the inlet to the governor, so as to give the governor a chance of working as evenly as possible. They found that they had got practically no use for a bye-pass in the exhauster-house since introducing retort-house governors.

It was much the same with the scrubbers and washers. Hourly tests were made of the strength of the liquor, and also hourly tests of the gas at the outlet, to determine the presence or absence of ammonia. When they were dealing with large works, one hour (say) of a gas containing ammonia, would mean a big loss. They took daily tests at the outlet of each box of purifiers, for carbonic acid. Where they had a set of four, practically they tested the last purifier. In Dundee, they had five sets. Therefore they made five tests each day for carbonic acid. They also tested for carbonic acid at the outlet of the scrubbers. They tested the gas for sulphur as it was sent out to consumers; but this was a matter which they paid very little attention to, because they found it so constant that they did not require to. If they had used one class of coal for some time, and were also employing oxide of iron and lime, they were able to keep the sulphur other than sulphuretted hydrogen pretty constant. They took a note morning and evening of the temperatures and pressures of each purifier. Those who had been in the habit of using oxide of iron had realized sometimes that when the purifier was active, and doing its work, they generally found its temperature had a tendency to rise. If this was noted periodically, it was a very interesting study indeed. When the purifier became inactive, they generally found a drop

in the temperature. This was when they had to look out for sulphuretted hydrogen. They took hourly observations of the station-meter, together with the stock of gas in the holders, the temperature of the gas entering the station-meter, and the barometric pressure. An hourly observation was also made by the inferential jet photometer of the gas passing from the station-meter, together with the inferential test at the outlet of the gas-holder as it was going to the consumers. This subject, he thought, had not received the attention it deserved.

They often spoke of what was termed unaccounted-for gas. In the opinion of some, this gas must have been lost, possibly through leakage; but when it was pointed out what a difference extremes of temperature made, it would be at once seen that the matter was one worthy of some study. In the weather they were having, he thought he would be quite safe in saying that the gas as it entered the consumers' meters would not exceed 40° Fahr. They had it often registered at the station-meter at 80° Fahr. This was a variation of 40°. What difference would this make on the volume of gas? At one-fifth of one per cent. for 1° Fahr., the difference between 40° and 80° was equal to a loss of 7½ per cent. He might be dealing with extreme figures; but he wished to illustrate the point. There was always a difference that ought to be taken account of, and the reading of the station-meter corrected to standard temperature and pressure. Temperature affected volume considerably more than pressure of the atmosphere.

With reference to the governors, they took a continuous record of the pressure at the outlet. They also occasionally took the pressures in the city at various hours. He had always made it a practice, before and since he went to Dundee, in the month of December, at the period of maximum consumption, and between the hours of 5 and 7 p.m., to take the pressures in every street in the city, and have them recorded on a plan. Thus he had at once placed graphically before him any weak spots or points which required consideration and attention before the next lighting season came on. He had derived great benefit from this, and would continue the practice.

Having dealt with the works, he would now enter more into the commercial section of the management. In his experience, this was one of the things which paid anyone to make a study of. It was impossible for them to know how they stood unless at the end of each month they took exact records of all their proceedings. He took the stock of coal, lime, coke, tar, ammoniacal liquor, sulphate of ammonia, and benzol; and an exact computation was made as to the quantities produced. This was placed against the coal used and the gas made, and showed, at a glance, the position of matters, when comparison was made with previous records. If he found a difference in any of the items, he asked himself why they had used more or less than before. If they had been using more benzol, they might find the reason for it in colder weather; or they might have a like difference with some other article. In dealing with the matter in this way, he was able at once to place his finger upon any weak spot, instead of having to wait till the end of the financial year, when he might be asked about it. Then, independent of the monthly report, he had a daily report. This comprised a summation of all the daily readings in the various departments, together with the make of gas, number of retorts in use, &c. When he had this information before him in the morning, it gave him, in ten minutes, a very clear idea of what had taken place the preceding 24 hours. In considering the wages-sheets, as soon as the weekly pay-sheet was completed, an analysis was made of the wages paid in the various departments, and the exact cost brought out per 1000 cubic feet of gas made. He could tell the exact cost of the office staff; the cost per 1000 cubic feet of the coal gas and the carburetted water gas; the cost per 1000 cubic feet for every purifier; the amount paid for wages in respect of sulphate of ammonia and tar; and for the boiler-house, the analysis of coal, coke, refuse, lime, and repairs. The amount of wages paid for each, together with the total sum, was then placed alongside the cost per 1000 cubic feet of gas brought out.

He had got these figures for the past six years; and referring back to them, it was interesting to see how they had been able to economize in various things. The cost of carbonizing was a matter which affected them very largely. Shortly after he went to Dundee, carbonizing wages were as high per 1000 cubic feet as 3d., while at the present time they were running at about 1·5d.; and they were using the same plant. These economies were secured by close attention to all the various details. He also had a weekly check as to the overtime which was paid for in each department. If he considered the overtime excessive, he took steps to have it remedied. All accounts, before being passed on to the Treasurer for payment, were docketed and marked to the department with which they were connected. A summation was made of all these accounts at the end of each month. They also made them up for the quarter; and at the end of the quarter they could tell their position financially as well as the Auditor could. At the end of the year they were somewhat in advance of the Burgh Treasurer in computing the financial position of the undertaking for the twelve months, and were able to have anything which it was necessary to look into investigated before it became public property. He had, perhaps, said sufficient to show them what could be done by a little study and a little commercialism brought into their business. They were apt to consider their business more from a technical than from a commercial aspect. He wished to point out to them what benefits they would derive from a study of the things he had mentioned.

Mr. J. DICKSON (Kelty) proposed a vote of thanks to Mr. Yuill for the address. He would not attempt to deal with any of the points raised by Mr. Yuill, but would like to refer to the opening part, in which he alluded to the exclusiveness they should try to get rid of in connection with their business. The more they saw of the way in which others did their work, and the methods they adopted, the better it would be for them. He had himself derived great benefit from attending meetings of the Junior Gas Association. It took their minds out of the rut, and let them see that the only way of doing things was not as they were accustomed to think.

Mr. YUILL briefly returned thanks.

ECONOMIES IN GAS-WORKS.

Mr. A. R. WILSON (Perth) read a paper on the above subject. In the course of it he said that in these days of strenuous industrial life, when every unit of energy is taken out of plant, and when any little economy which leads to increased efficiency is quickly taken advantage of, it was necessary to be ever on the look-out for opportunities to improve upon existing results or practice. The manufacture and distribution of gas was one of those industries which never slept, so to speak. Every part of the plant was working ceaselessly, day and night. If they were getting bad results, they might have twenty-four hours of it. On the other hand, industry, method, and thoroughness brought a greater reward than in works where a nine-hour day ruled. The text-book dictum still held good to-day in regard to the relative importance of the retort-house; and, notwithstanding all that had been done, there was ample opportunity for the exercise of the inventive faculty, as witness the work of Messrs. Woodall and Duckham in the development of carbonizing in vertical retorts. To be able to produce 30,000 to 40,000 cubic feet of gas per retort, and 15,000 cubic feet of gas per ton, and to obtain 25 per cent. more gas on the same floor area, while reducing the cost of material and wages by 30 per cent., conserving the illuminating power, and improving the conditions of labour, was surely a great achievement. Other advantages were freedom from smoke and dust arising from charging and drawing operations, and the abatement of steam and noxious vapours connected with coke quenching. It was of special interest to them that the vertical retort could be applied to small and large works alike.

In common with other industries, machinery was rapidly taking the place of hand labour in gas-works. The adaptation of stoking machinery to the requirements of small gas-works was worthy of special consideration. In every new departure there were disadvantages which, to some extent, counteracted the advantages. The disadvantages of machine stoking were well known, particularly the items of repairs and maintenance, and the standing charges, which were constant, whether or not the machine was fully employed. The late Sir George Livesey, whose expressions were so practical and memorable, said that it was not profitable to provide machinery for more than three-fourths of the maximum output; and almost invariably the combined figures for carbonizing wages and repairs and maintenance were, with one or two notable exceptions, as low with hand labour as with machine work. At the same time, machine stoking was extending, and they found it being introduced into works where, for the greater part of the year, the quantity of coal handled did not exceed one ton per hour. It was difficult at first sight to see the wisdom of such a policy, or to discover where the interests of true economy were served. If the fullest possible advantage of labour saving was to be realized, other interests must oftentimes be sacrificed. In a small works, the parting of the ways began with the removal of the "stop-end," and the adoption of the "through," retort. "Stop-ends" required the use of two machines; otherwise it became necessary to propel the machine from one side of the bench to the other. Even then three men would be wanted to work the benches efficiently—one to work the machine, one to open and shut doors and clear pipes, and one to attend to the coke. A little consideration would show that the manual labour expended in these operations was the recognized amount required to perform the work without the aid of machines; and it followed, therefore, that the first cost of the machine, *plus* wear and tear, was an unnecessary charge for six months of the year. The explanation was that machinery would not attend to the opening and closing or the cleaning of the retort-lids, jump pipes, or perform any work but the simple operation of charging and discharging the raw material; and where the quantity dealt with was small, it was not possible to effect a saving commensurate with the outlay.

The wear and tear of retorts was always a serious item in the expenses of gas-works; and the comparatively short life of the retort in the North, as compared with the South, had been the subject of comment. At one time, he believed, two winters' work—roughly 500 days—was reckoned an average life in Scottish gas-works; but within recent years an effort had been made, and not without success, to improve upon this result. There was considerable leeway to make up, however, as the accepted minimum in England was 1000 working days, and he knew of a works in Lancashire with a record of more than 2500 days. Account must be taken of the high temperature and short duration charges prevailing in Scotland, and the savings effected by larger mouthpiece yields. That the fault did not lie with the material employed was proved by the experience of Scottish engineers who had tried fire-clay retorts of English manufacture with most un-

satisfactory results as compared with "Glenboig" and "Hurll" brands. He believed that an unnecessary sacrifice of strength had been made in setting retorts on light and widely-spaced transverse walls, because in Perth they found 9-inch walls and 7-inch spaces entirely satisfactory; retorts carbonizing 20 cwt. per day having a working life of from 1100 to 1800 days.

Turning to another development in the retort-house—the introduction of retort-house governors—they heard nothing but praise of the improved results they brought. Undoubtedly they secured an increased make per ton, and gas of better illuminating power; the retort carbon trouble was practically abolished; and there were fewer stopped pipes. The great end to strive for in the management of retort-house governors was a "level gauge" on the inlet, so that the gas evolved might escape freely and unhampered by excessive pressure. Where daily charts were taken of the conditions existing at the inlet of the governor, they expected to get an unvarying line; but this could only occur where there was absolutely no seal on the dip-pipes. In Perth, they had a gauge connection on every dip-pipe, and the seal was regularly noted. Their working seal was ¼-inch, which gave a maximum pulsation of about ½-inch on the dip-pipe gauge, and about $\frac{1}{20}$th to $\frac{1}{10}$th inch pulsation at the governor inlet—a satisfactory absorption, and sufficient evidence to show that the retort-house governor was a reliable sentinel between the exhauster and the ¼-inch of seal, or, to put it another way, between the gas and the atmosphere or furnace gases. They had still, however, the pulsation in the retort, due to the ½ inch of water-seal; and the next step in advance was surely to abolish the seal altogether. That this was practicable had been proved by experiment. If a "level gauge" existed in the hydraulic main, air could not be drawn in, neither could gas force its way down the ascension-pipe; the altitude of the bridge-pipe from the nearest gas outlet—the open mouthpiece—being sufficient to counteract even $\frac{3}{20}$ths of an inch of back-pressure in the hydraulic main. Charts had been obtained showing nearly mathematically straight lines, which proved one of three things—(1) that there was no seal on the dip-pipe; (2) that the chart had been taken some distance away from the bench, where slight pulsations would not be appreciable; or (3) that the register itself was not sensitive enough. While the perfecting of the hydraulic steam regulator had greatly improved the efficiency and reliability of the exhauster, it was advisable to record the speed of the engine by means of a counter. This record of the revolutions made as compared with the gas passed was useful in detecting "slip" on the exhauster, bye-passing, and waste of steam.

Too much attention could not be given to the question of the regular charging of retorts. All charges should have a stated time in which to distil; and if they were arranged so as to overlap each other, the heats were more regular, the yield of gas was improved, the illuminating power was conserved, and the condensers, washers, &c., were made more efficient because of the uniform flow of gas through them. Workmen, in their anxiety to get through their work, were inclined to "take time by the forelock" in the matter of charging, regardless of the results which followed. It was not sufficient merely to post up a time table; some responsible official must see it was rigidly adhered to.

Great gain attended the frequent flushing of condensers. The deposit of tar inside the pipes reduced the area and efficiency of the condensing surface. In Perth, they had a special arrangement whereby every pipe in the atmospheric condensers received a periodical flushing with cooled ammoniacal liquor; and the amount of tar washed out was surprising. The improved condensation had increased the efficiency of the washers and scrubbers, the amount of sulphuretted hydrogen at the outlet of the last scrubber ranging from 150 grains to 200 grains per 100 cubic feet, while the carbonic acid at the same point had been reduced from 0·8 to 0·6 per cent. The system had also other obvious advantages in controlling temperature, &c.

Careful management of the washers and scrubbers was especially necessary in Scotland, where the nitrogen available in the form of ammonia varied so much with different coals. In a changeable climate such as theirs, all this plant should be under cover, and the temperature of the feed liquor and water under perfect control; otherwise the quantity of water that was sufficient for absorbing the ammonia to-day might not be so to-morrow, owing probably to changes in the atmospheric conditions. It was of great importance, therefore, that frequent tests should be made of the gas at the outlet, to detect the presence of any ammonia; bearing in mind that a loss of even as little as 12 grains per 100 cubic feet of gas represented 0·48 lb. of sulphate per ton of coal carbonized.

Where the proportion of cannel and other coal containing a relatively large amount of impurities was small, the total sulphur might be reduced to 20 grains per 100 cubic feet of gas with oxide of iron as the purifying agent; but Lux material gave promise of improved results as compared with oxide of iron or bog ore. The amount of iron in the dry material, calculated as $Fe_2(OH)_6$, was about 90 per cent., which was equal to the best prepared oxide of iron; yet it was as light and porous as natural bog ore, and it had the advantage of containing about 5 per cent. of sodium carbonate, which made it active right away. It was specially suitable for mixing with partially spent oxide of iron which had become mashed with acid.

Discussion.

The PRESIDENT remarked that the paper contained many points which were suitable for debate. There was the subject of vertical retorts. Probably in Scotland they had not much knowledge of them; but he thought the fact that they had been taken up so heartily in England, in all good faith, should lead them to study the matter very closely. The question of retort-house governors he could not say would afford much ground for discussion, because after what had been stated by Mr. Yuill, together with what they knew to be the experience of other engineers, there could be no doubt whatever that the retort-house governor ought to be installed. Mr. Wilson touched upon the renewal of retorts, and referred to their life being longer in England than in Scotland. He was glad that he mentioned the difference in temperatures, because he thought that the long life was due to the temperature. This, of course, raised the question of retort-settings and the duration of charges.

Mr. G. KEILLOR, jun. (Broughty Ferry), hoped the Association would soon come back again to Dundee. On the subject of vertical and inclined retorts, there was no doubt in his mind that the former was the system of carbonizing for the future; but at present, he should say, it was rather beyond him. Retort-house machinery was a subject they could not dogmatize upon. In some works it would be suitable; and in many works it would not. He supposed that they in Broughty Ferry were the smallest works which had machinery of some sort; and it certainly did not pay them. They could work considerably cheaper without it. Their plant consisted of coal breaking and elevating plant, and manual charging machines. Two or three years ago he looked into the matter, and found that they were dropping by the machinery from 6d. to 9d. per ton of coal carbonized. It was the case that in England retorts had a longer life; but he did not suppose that any Englishman would like it to be said that they did not work with as high heats as in Scotland. He thought they did. Probably the reason that in Scotland they could burn four-hour charges, as against five or six hours in England, was because the sort of coal they used in Scotland was more easily carbonized. Where a large proportion of cannel was used, it stood to reason that the heats would be higher, in order to get the gas off. He had a setting of retorts which had run 1200 days; and as they were fully 12 feet long, it might be said that this setting had put in a third more work than an ordinary setting of 9 feet. He hoped this setting would have a good many hundred days of life yet. He quite approved of all that had been said about retort-house governors. He did not have one, but was moving in that direction, though he did not think he would save very much, seeing that it did not pay him to run to 10,000 or 11,000 cubic feet per ton of coal. They knew some stokers were guilty of not drawing clean, but leaving coal or coke banked up at the far end of the retort; and if this were not attended to, there was considerable waste of carbonizing area, and also of the output of the retort per day. The results of washing and scrubbing given by Mr. Wilson were marvellous. To come down from 0·8 to 0·6 per cent. of carbonic acid was very wonderful indeed. It would have added to the interest of the paper had the impurities at the inlet of the scrubber or washer also been stated. It was becoming customary to use oxide of iron in purification; and he thought rightly. In his town it was simply impossible to get rid of spent lime, and so four or five years ago they resolved to use oxide entirely. It had paid them very well to do so. There were other economies in gas-works, which the author probably considered were not worth mentioning. For instance, there was the weighing of coal as it came into the works. Recently he had had a shortage of about 1 per cent. in a quantity of coal delivered to them. He had seen waggons 4 per cent. short. He was told that 1 per cent. was not very much, and that he ought to consider it correctly weighed. He did not consider it correctly weighed. One per cent. would, in his case, be equal to about £70 per annum, which would be a great loss, indeed, to him.

Mr. W. MITCHELL (Dundee) expressed a desire to have more information as to how it was possible to get 15,000 cubic feet of gas per ton of coal in vertical retorts. He knew the coal they used in Dundee; and they certainly could not get this quantity of gas from it.

Mr. W. DUNLOP (Kirkcaldy) was sure they had all listened with pleasure to what Mr. Wilson had said about economies in gas-works. They could not have too many finger-posts pointing in the direction of economy. Mr. Wilson indicated some advantages of the vertical retort. This form of retort had long been successfully used in the Scotch oil industry; and from the results now obtained, it looked as if it was going to be the retort of the future, in gas-works. It was this form of retort which saved the oil industry in Scotland; and it was surprising that it was not introduced for gas making at a much earlier date. Before introducing stoking machinery, they should seriously consider from all points what advantage they were going to gain, because they must admit that in many medium-sized works stoking machinery had not proved the success that some expected it would. It was worthy of note that the cheapest gas made in Scotland was produced by hand stoking. The percentages of impurities mentioned by Mr. Wilson were very low indeed. Might he ask him what strength he worked the liquor at?

Mr. R. B. WADDELL (Dunfermline) remarked that machine stoking might be suitable in one works and not in another. Last year, using machinery, their carbonizing cost was 2·33d.—a saving of 1·23d., which was surely worth taking account of in a works making 120 million feet a year. Retort renewals largely depended on the machines used in stoking. They had a manual charger, which was very sore upon the retorts. They found that if the

transverse walls were placed 9½ inches apart, the walls themselves being 9 inches, the retort stood quite perfectly.

Mr. F. A. West (Kirkcaldy) said there was no doubt that when they had a regular flow of gas there was much better purification results. It would have been interesting, perhaps, if Mr. Wilson had given them his opinion with regard to the driving of exhausters. He believed that gas-engines were used in small works with success; and he thought they might be employed in gas-works for other purposes than driving exhausters—more, perhaps, as an advertisement than anything else. No doubt; they could be used with more economy, in some places, than steam engines.

Mr. J. Dickson said that retort renewal seemed to have taken up most of the attention of members who had spoken. The true value of machinery was to be viewed according to the work that it accomplished. If in Perth they had a mouthpiece yield of 10,000 cubic feet, and taking the average of the figures given by Mr. Wilson as to the life of a retort at 1400 days, a retort would yield, during its working life, 14 million cubic feet of gas. Compare this with the life of 2500 days cited by Mr. Wilson. They would find that the average make per mouthpiece in England was fairly enough stated at 7000 cubic feet—because they used a coal which lay closer, and therefore the gas did not come off so readily. On this basis, a retort in England would produce 17½ million cubic feet. But it was hardly fair to compare Perth with the record of 2500 days; and if they took the average life of retorts in England to be 1500 days, the life production would probably be 10½ million cubic feet, and the result would be that much more was being accomplished in Perth. The capital charges would also be less, because the plant was more compact, and they would thus be able to work more cheaply. Of course, if they in Scotland could get a longer life out of their retorts, and obtain bigger yields at the same time, so much the better. He did not think the heating would suffer in having the supporting walls and spaces as stated by Mr. Wilson—in fact, no oven was right unless they had power behind to burn it down, if they cared. He meant that the difficulty now was not in getting, but in controlling, the heat. The President had remarked that he did not think there was very much more to be said about retort-house governors; but, for his part, he would like to have a little more information. He had there a chart which he took in order to see if he could possibly better his work. It had fairly level fluctuations of 2-10ths or 3-10ths of an inch. This was got by means of a compensator—a steam-governed regulator; and it was not from the inlet of the exhauster, but from the hydraulic main itself. An inch-and-quarter pipe was taken from the hydraulic main. It was practically useless to regulate at the inlet to the exhauster, because they never knew what was going on inside the exhauster. He had got good enough results since adopting this means of regulating the exhauster; and a saving of from £20 to £25 was worth considering in a small works.

Mr. Wilson, in closing the discussion, said that questions had been asked about the amount of impurities at the outlet of the scrubbers or washers. It was very low; and he could only account for this by the very efficient scrubbing and washing the gas had got. The strength of the liquor was 8½ oz. at the outlet of the scrubbers; at the inlet, it was about 2 oz. The late Mr. W. Young long ago held that the gas could be purified by means of gas liquor; and there seemed to be little doubt that this principle was now entering into their work.

The President intimated that a letter had been received from Mr. G. Braidwood, the Hon. Secretary of the Western District, suggesting that, as they were about to make up their syllabus for next session, a joint meeting of the districts might be arranged—say, at Falkirk. He moved that they approve of the suggestion; and this was agreed to.

On the motion of the President, a vote of thanks was accorded to Dr. Lumsden, the President of the Technical Institute, for granting the use of the rooms for their meeting.

The company were entertained at tea in Lamb's Temperance Hotel.

Mr. W. Dunlop proposed a vote of thanks to the Corporation of Dundee for their handsome entertainment. He said they had had a very successful meeting; and he thought it appropriate that they should recognize what the Corporation and the officials had done for them.

Mr. Yuill acknowledged the vote.

PREVENTING WASTE AND MISUSE OF WATER.

Model Code of Water Regulations.

It may be remembered that rather more than five years ago a representative Committee, known as the Joint Committee on Water Regulations, was formed, on the initiative of the Worshipful Company of Plumbers, at a conference held in the Guildhall. It was evident from the attendance on that occasion, and from the widespread interest which the gathering aroused among all classes concerned, that there existed a very general desire on the part of water authorities, engineers, architects, and others to co-operate for the purpose of codifying, and as far as possible standardizing, the bye-laws and regulations in general use by water authorities throughout the United Kingdom. The Committee as at present constituted includes representatives of water undertakings supplying more than three-fourths of the consumers served under statutory powers; and the Secretary is Mr. W. R. E. Coles, with Mr. Percy Griffith, the Secretary of the Association of Water Engineers, as Assistant. On entering upon the work entrusted to them, the Committee first considered a summary of the bye-laws and regulations at present in use by fifty-four of the principal water undertakings in the country, and then formed themselves into three Sub-Committees—on Bye-Laws and Regulations, on Fittings and Materials, and on Workmanship. Upon their reports and findings the Committee agreed to a model code of bye-laws and regulations, which has lately been published.

It is explained in the preface that, in the work already accomplished and that now in hand, the Committee have studiously avoided anything in the nature of heroic schemes of reform involving either substantial expense to consumers or unnecessary interference with prevailing practice. They have endeavoured to avoid any undue restriction in the use of water, which might prejudicially affect the public health, while effectually preventing waste. They considered the question of testing and stamping fittings, and adopted a scheme under which their standardization mark, which has been registered under the regulations of the Board of Trade, will be stamped on all fittings complying with the standard specifications. As the existing regulations relating to plumbers' work vary greatly in method and detail, the Committee thought there was ample scope for improvement. They therefore devised a scheme to give fuller effect to the object of the regulations relating to the competency of plumbers, and to render more effective the system of "authorizing" plumbers to execute work in accordance with those regulations.

Summarizing the provisions of their model code, the Committee point out that they seek, first, to codify the chief administrative provisions relating to the distribution of water for domestic and other purposes; and, secondly, to set up such standards of practice as represent an irreducible minimum of efficiency—in other words, to establish a standard of practice below which no work should be permitted, in the common interest of both suppliers and consumers of water. In presenting their code, they strongly recommend that it should be adopted *in extenso;* and that no amendment should be introduced which is not necessitated by peculiar local conditions. They also suggest that, in adopting the standards of fittings and workmanship, authorities should not enforce the alteration or renewal of existing fittings, except in cases where defects are evident, or where waste, contamination, or misuse is likely to arise. By limiting the application of the new standards to new work and to the cases just cited, the operation of the code will be prospective rather than retrospective; and thus consumers will be relieved from needless hardship or expense arising from the immediate adoption of the code. The bye-laws and regulations formulated by the Committee are 22 in number. They are followed by five schedules and an appendix; the last containing extracts from the various enactments relating to water supply.

The pamphlet embodies the results of five years of useful work in a direction in which it was much needed, as evidenced by the cordial co-operation of the several interests represented by the Committee. We trust their anticipations may be realized, that this co-operation may go far to facilitate the general administration of water undertakings throughout the country, and serve as a convenient basis upon which future legislation may be founded.

A Disputed Gas Account at Gainsborough.

Last Tuesday, at the Gainsborough Police Court, the Urban District Council, who are the owners of the Gainsborough Gas-Works, sued Dr. Cassan for £5 os. 4d. for gas consumed during the June quarter of last year. It was explained that the defendant had allowed the matter to go into Court as a test case. Mr. H. A. Bell, the Deputy-Clerk, who appeared for the Council, argued that the register of the meter was *primâ facie* evidence, which it was for the defendant to disprove. The Council were quite willing, in the event of a meter-test being ordered, to abide by the decision of the Bench. Mr. Tweed, for the defence, said he did not oppose Mr. Bell's contention that the meter was accurate in its work of registering; but he did hold that the amount claimed was wrong. Mr. Bell called Mr. J. Baldwin (the Gas Manager), two inspectors, and other officials, with the object of showing that the amount of gas charged for had passed through the meter, and that the sum named was correct. Dr. Cassan said his average for the June quarter for eight years had been £2 9s. The present account showed a jump of 10,000 feet over a summer, and of 2000 feet over a winter, quarter. It was preposterous to say he had consumed so much more gas in a summer quarter. In winter he had two gas heating-stoves going; and in the summer they were not in use. He did not have a gas-cooker. The Bench expressed a wish to have the meter tested; but as the accuracy of the register was not questioned, they had no power to make an order. Mr. Tweed said he was willing to settle for £3; but Mr. Bell remarked that if the Council agreed, they would have all the gas consumers questioning their accounts. Eventually, the Bench made an order for £3 7s., adding that they thought a clerical error, or something of the sort, had taken place. It was decided that each side should pay its own costs.

The Cardiff Corporation Bill, for the construction of additional water-works and for other purposes, was approved at the meeting of ratepayers held to consider it; but notice was given by two gentlemen present that, in regard to the provisions for wiring houses for electric light and for the supply of water to bodies outside Cardiff, they would demand a poll.

STREET LIGHTING IN SMALL URBAN DISTRICTS.

By E. F. Willson, Surveyor to the Epping Urban District Council.

[Abstract of a Paper presented at the Meeting of the Institution of Municipal Engineers, Jan. 16.]

In glancing through the Technical Press, it is rarely that one finds much information regarding incandescent street lighting in small urban districts. There is hardly another subject that provokes so much acrid debate among the councils we serve as that of street lighting; and not infrequently the surveyor comes in for much attention at such times.

In choosing columns for incandescent lighting, those of a stiff type and capable of resisting shock should be adopted. The octagon section is about as stiff as any. Cast-iron ladder-bars should not be used. Either the column should be drilled and tapped, and a wrought-iron bar screwed in, or a bar should be attached to the frog supporting the lantern. It would be an advantage if every column had a small door near the base. This would allow of a stopcock being fixed on the standpipe, so that the gas could be shut off near the ground level, without the trouble of capping when the burner and top gear are removed. In narrow streets, it is much better to use brackets fixed to walls or houses. I have found bracket-lamps to be much more economical in mantle upkeep. The service-pipe from the main to the standpipe should not be less than ¾ inch diameter; and care should be taken to see that it does not fall from the main to the lamp. The distance lamps are apart is much governed by local conditions; but I have found the following rules answer very well: Main streets, 50 yards apart; residential streets, 60 to 70 yards apart; outside roads, 90 yards apart.

For incandescent lighting an efficient windproof all-copper lantern should be selected. Lanterns with metal tops and reflectors are preferable to those with glazed tops, and save much expenditure in repairs. It is better to secure the lanterns to a frog fixed on the top of the columns, instead of fixing in the cumbersome and unsightly cradles much used at one time. For the main streets we have 34 of Marriage's patent "Reigate" lamps. While these lamps have a graceful appearance, and prove very economical in the consumption of mantles, they come somewhat expensive in the renewals of glass cylinders and flexible connections. I have, however, found a way to reduce expenditure upon these items by winding the flexible connections with rubber tape fixed on by solution before putting them up. With regard to the cylinders, these, as a rule, crack vertically; and I find that if a strip of rubber tape is cemented on the top and bottom of the cylinder, about ½ inch from the edge, and strengthened by a band of copper about ¾ inch wide, secured by a small nut and bolt, the life of the cylinder is increased, and the effect is not unsightly.

The question of burners is another matter much governed by local requirements. In this particular district we have No. 4 Kerns for main streets, one residential street is lit with Welsbach "C," and the remainder chiefly with Bray's incandescent, together with some "Block" lights, and a few anti-vibrator burners at points subjected to shocks. Upon the whole, I prefer the Bray. It is inexpensive, and costs little for repairs. The whole of our burners are fitted with bye-passes; and I have had stout copper wires fitted to the levers in place of the chains, which were always breaking. At one time we used the small glass chimneys for burners; but I found them very expensive on account of frequent breakage, and mica chimneys quickly become burnt and opaque. After trying many patterns of chimney, I find 4-inch pear-shaped globes fitted to the burner by means of a globe-ring over the gallery to be by far the most economical. For the year 1906-7, the consumption of chimneys (about half being the small type) worked out at 1·02 per lamp. For 1907-8 (about three-quarters of the whole number being pear-shaped globes), the consumption figure works out at 0·82 per lamp. This year (all being pear-shaped globes), the average appears still more satisfactory.

We have tried nearly every make of mantle on the market, and have found the "Ironclad" to be the most economical. Taking a particularly bad part of the year, one finds that during the period from the week ending Nov. 3 to that ending Dec. 22, 1906, 104 mantles of various makes were used on 112 lamps; in 1907, during the weeks between Nov. 2 and Dec. 21, 150 mantles of various makes were used on 113 lamps; and in the weeks from Nov. 7 to Dec. 26, 1908, 59 "Ironclad" mantles were used on 115 lamps. I find the average mantle consumption per lamp works out for 1906-7 at 5·61 mantles, and for 1907-8 at 5·56 mantles. The present year will work out at much less.

In our district the lamps are divided into eleven sections of a varying number of lamps to each. One meter is provided in each section; the gas used being paid for according to the register of the meter in that particular section. I have found it a good plan to have the meters taken on the first Monday in every month, and entered in a special book, quite independently of the Gas Company's quarterly reading. By this, one quickly observes if any waste or neglect is going on. Personally, I prefer the average of all meters as a basis for charging. It is, in my opinion, fairer; and it also saves a deal of calculation for each section.

Our full or winter lighting extends from about the last week in August to about the first or second week in May. During the summer we only light nine lamps in important parts of the town; the other lamps being taken down and put in store for repair. We are not supposed to light for three nights before the full moon, or until two nights after. This is, I think, very unsatisfactory. For lighting purposes, the district is divided into two rounds: No. 1, having 56 lamps; and No. 2, 54. An outside part of the district, comprising five lamps, is lighted by a special arrangement. The two districts are scattered; and one hour is allowed for lighting and extinguishing. A contractor is engaged at a weekly wage of 27s. per week to light and put out No. 1 district, and to clean and repair the whole of the lamps under my directions. For No. 2 district, I have two roadmen, alternate weeks each, at 7s. per week, for lighting and extinguishing.

Mantles and all other small goods are booked out in dozens from the stores, and every article used is entered on the man's time-sheet against the number of the particular lamp it is used for. This is entered by me in a book I keep, having a page for each lamp; and at the end of the lighting season this is totalled up in a return for each street. It is thus possible to see at a glance how any particular lamp in any year compares with another. It is a little trouble at starting, but soon becomes easy; and the results and checks obtained are found to be most satisfactory.

The comparative costs for recent years are as follows:—

—	1905-6.	1906-7.	1907-8.
—	Contract No check	First year Check systems	Second year Check systems
Cost	£303 6 6	£267 4 0	£236 16 0
No. of lamps	112	113	115
Cost per lamp	£2 14 2	£2 7 3½	£2 0 6

I cannot give detailed figures for 1905-6; but for 1906-7 and 1907-8 they were:—

—	1906-7.	1907-8.
	£ s. d.	£ s. d.
Gas	129 17 7	118 12 11
Wages	85 17 0	75 9 4
Fittings and repairs	51 9 5	42 13 9
	£267 4 0	£236 16 0

I should like to state that the lamplighter for No. 1 district is employed by us at various kinds of work during summer months. The total number of nights that all lamps were lit for the years 1906-7 was 237; for 1907-8, 241. This does not include summer lighting. The price of gas is 3s. 6d. per 1000 cubic feet.

Discussion.

The President (Mr. J. T. Pegge, of Durham) remarked that the paper was a very practical one, and would be particularly useful in connection with the lighting of small districts. He must congratulate the author on having been able to reduce his gas bill to £2 0s. 6d. per lamp per annum, with gas at 3s. 6d. per 1000 cubic feet. It seemed to him that the price paid for these incandescent lamps, including all costs and replacements of mantles, was extremely low. Of course, as the author said, they employed the old-time method of for three months in the year only having two or three of the lamps alight. He (the President) wished that all councils could be persuaded to see the error of their ways, and adopt the plan of all-night lighting, or at any rate only put out part of the lights at about 11 o'clock. However, the paper showed that Mr. Willson had been the means of effecting for his Council a very great saving in cost; and the practical way in which the details were set forth claimed for it a careful reading, which should prove profitable to those who studied it.

Mr. H. Boot (Tunbridge Wells) remarked that the subject was naturally one which was of great interest to him, both from a gas and an electrical point of view, because it so happened that in several towns he had been acting for this was one of the most troublesome matters which councils apparently liked to quarrel over. Whether it was due to local interests in gas or in electricity, one could not altogether say; but the fact remained that, certainly in smaller towns, where there were two competitors in the same place, one found that a large percentage of the time of the councils was taken up with this matter. Before criticizing Mr. Willson's paper, he would like to thank him for it and to congratulate him on the excellent way in which he had dealt with his subject. The work he had to do was not altogether easy, though it might seem simple. The smaller the district and the more scattered the lamps, the more trouble they were likely to give. Referring to the question of columns and brackets, the author said he thought it would be a great advantage if every column had a small door near the base. He took it Mr. Willson did not mean this to apply to all lamp-posts, but to the lights he was turning out during the summer. The whole *crux* of public lighting depended upon the capital outlay per post. Anything that tended to increase this outlay without any increase in efficiency, militated against the advantages of any particular system. He had always advised that the capital outlay per post should be kept as low as possible. If they required a door, or any arrangement of that kind put in the post, not only would it weaken the column in the event of a cart knocking up against it, but it would also increase the cost of it. Then Mr. Willson said that in narrow streets it was much better to use brackets fixed to walls or houses, and that he had found bracket-lamps to be much more

economical in upkeep. Strange to say, he (Mr. Boot) had found just the very opposite. Whether the buildings in the area of the Epping Urban District Council were made of such extraordinary material that there was no vibration at all, or in solid stone, he did not know; but his own experience had been that a lamp-bracket required more mantles than a good, stout, solid column fixed in the ground. The distance apart of lamps the author mentioned was in the main streets 50 yards, residential streets 60 to 70 yards, and outside roads 90 yards. He (the speaker) had prepared a list of the whole of the distances in various towns, taking urban districts, large towns, and small towns; and he found the general practice in main streets where electric arc lighting was used was to put the lamps about 70 yards apart in the large towns, and up to 100 yards apart in the small towns. In the case of high-pressure gas, as in use in Kingsway and Aldwych, they varied from 40 to 70 yards apart. In residential districts in large towns, the general distance seemed to be 65 yards apart. With regard to outside roads, it was difficult to name the distance. Many of them were as far as 150 yards apart. But in certain towns experience had taught him that, if they happened to be gas-lamps, and the gas was supplied by a company, the company generally made it a condition that if they lighted these lamps, they should not be a greater distance than 70 or 80 yards apart, unless a higher price than usual was paid. He thought that copper lamps were well worth the extra money they cost. As to the mantle consumption, Mr. Willson stated that for 1907-8 the average worked out at 5·56 mantles per lamp. He (Mr. Boot) did not know whether the Epping district was peculiar in the way of protecting its columns; but all he could say was that he must be using very extraordinary mantles, if only 5½ per post were required over the whole of a year. They had only got to have a couple of nights such as had just been experienced, and they could go round to the gas-lamps in any area and find that 75 per cent. of the mantles required renewal; and therefore a large proportion of the 5½ mantles would be gone in two nights. He rather thought the author would not be able to keep up this excellent average, unless the columns were protected in some peculiar manner. Then Mr. Willson spoke about the meters, and said that in his district the lamps were divided into eleven sections, and one meter provided for each; the gas used being paid for according to the register of the meter in that particular section. This was the plan adopted in many places; but he (Mr. Boot) thought that where gas was bought by a municipal authority from a company, as generally was the case in the smaller districts, it was more satisfactory for the authority to have a complete price per post, to include everything—hire of column, maintenance, lighting, extinguishing, and cleaning, and gas—and have a system of fines in use where lamps were reported by the police to be unsatisfactory or not alight. This undoubtedly saved the surveyor a great deal of trouble. The President made a remark about the cost being extremely low. It did seem so. But this was clearly explained by the author when he said that during the summer they only lit nine lamps in important parts of the town; the other lamps being taken down and put in store for repair. They were not supposed to light for three nights before the full moon, or until two nights after. They had 115 lamps; and out of this number only nine were lit in summer. Of course, there were very few districts where the ratepayers would to-day put up with this sort of thing. He would like more information with reference to the number of lamps that a lamplighter could turn on, clean, and keep in order. The author had divided his district into two sections of 56 and 54 lamps. He (the speaker) had found it was quite easy for a man, with the lamps about 70 yards apart, to clean, light, extinguish, and keep in fair repair (not carrying out elaborate repairs) from 80 to 90 lamps; and the time taken for lighting and extinguishing should be about 57½ minutes, if the man was at all sharp in his work. This question of lighting and extinguishing was very important. The man had to turn out at all hours; and though one did not require all his time doing the work, it was necessary to pay him considerably more than for the time occupied in carrying it out. While on the question of lighting lamps, he would like to mention the question of automatic controllers for switching gas-lamps on or off, such as were in use in, among other places, Bournemouth and Liverpool. At the latter place, he found they had 272 controllers, and that the failures worked out at 16·5 per month. Well, he had had a good many controllers in use; but he was afraid he had not got anything like such satisfactory results. Probably his had been in use rather too long; and as those at Liverpool were all new, Mr. Smith, the Lighting Inspector, might have a similar experience. It seemed to him that it was necessary to get somebody to see that controllers did their work. Arising out of the question of public lighting was that of candle power. They saw such extraordinary results given with reference to the candle power of gas and electric lamps, that it might be interesting to know the results of one or two photometrical trials made with particular lamps, where the candle power was said to be a certain amount. Taking the ordinary Welsbach incandescent burner consuming 3·5 cubic feet of gas per hour, the makers claimed that it would give a light of no less than 70-candle power. The highest power he had ever been able to get out of this burner had been about 35 candles, when the mantles were in perfect condition. It was true that with a certain pressure of gas and a new and special mantle, it was possible to get 70 candles; but what they wanted were commercial results, and not special tests of this sort. Again, they often found that municipalities were severely criticized because they adopted electric lighting for the streets instead of gas. They were "called over the coals" and told it was more expensive than gas. Here, again, there were statistics; and he could inform them of what had actually occurred in Tunbridge Wells. There the Corporation had taken over 400 lamps from the Gas Company—or rather, they had 200, and they were now taking over the balance of 200 more. The Electrical Department were supplying these lamps at 11s. cheaper per post inclusive than the Gas Company had tendered for the same number. The price was not exceptionally low; and there was no doubt that there was a satisfactory profit to the Municipality in supplying the lamps. The question was coming on very much as to which was the better form of illuminant. When the choice was between incandescent gas and the old carbon filament lamps, it must be admitted that gas was far superior for street lighting; but when they came to the metallic filament electric lamps, in which they were only taking 30 per cent. or less of the current for the same candle power, the position was entirely changed, and there were very few towns or urban districts in this country that could not by changing over to electricity, where the cables were laid, effect a considerable saving. Certainly they would get a better light—that was to say, in times of gales, frosty weather, and other conditions under which gas varied, they would find the candle power of the electric lamp was constant. The author did not say whether the columns at Epping belonged to the Urban District Council or the Gas Company; but he would be glad to know what was allowed for depreciation of lanterns, burners, and fittings. Of course, the depreciation of a cast-iron column was very small. It might be taken to have a life of from fifty to seventy years; but it had to be borne in mind that the method of lighting streets was likely in the next few years to alter, and therefore it was not always advisable for local authorities to own their gas-columns. He proposed a vote of thanks to Mr. Willson for his paper.

Mr. T. MUNDY (Woolwich), in seconding the motion, said he thought it was a "penny wise and pound foolish" policy to make it a practice to turn out lamps during any part of the year. In his opinion, every street should have certain lamps in lighting every night. He also thought that lamps—incandescent gas or electric—should be placed not more than 75 yards apart.

The PRESIDENT, referring to Mr. Boot's remarks about automatic lighting, said there was a little town named Barnard Castle, in the county of Durham, which had had automatic lighting now for about nine years; and he did not think there had been more than 1 per cent. of failures per month. It was a very badly exposed, hilly country, subject to heavy gales and big snow-storms. But despite all this, the automatic system was so good that he endeavoured to get his own Council to agree with the local Gas Company to fix the controllers for lighting and extinguishing, and do away with the men, who took perhaps an hour and forty minutes to do forty minutes' work. They began at one end of the district; and sometimes in the bad weather did not get to the other end to time. The automatic system stopped all this. In his city, they had a plan of lighting the lamps from an hour after sunset to an hour before sunrise. At 11.30 one-half of them were turned out. The inclusive price per lamp per annum was £3 0s. 6d. If they had the automatic controllers, they would be gainers in the matter of light.

Unfortunately, Mr. Willson was not present at the meeting to reply to the remarks made during the discussion or to acknowledge the vote of thanks which was heartily accorded to him for his contribution.

Effect of the Frost on Lead Pipes at Liverpool.—Dealing with the water supply of Liverpool during the fortnight covering the period of the recent frost, Mr. J. Parry, the Engineer, says that though the frost only lasted a comparatively short time, it was exceptionally severe; and when the thaw followed, there was a very considerable escape of water from burst pipes. Altogether over 4027 leakages were reported at the water office or discovered by the inspectors. Only ten of these leakages, however, occurred in pipes laid by the Corporation; two being in lead pipes, and eight in small iron pipes. All the other leakages were from private lead pipes, and chiefly from lead pipes in outside water-closets and in back yards. Before the thaw, the daily consumption was about 28,000,000 gallons; but when the thaw took place, it rose to 46,320,000 gallons. This was on the 31st ult., and in spite of the fact that a considerable area was placed on intermittent night service so as to obtain a better day pressure, and to prevent the flooding of property.

Price of Gas to Prepayment Consumers at Warrington.—Mr. Peacock moved, at last month's meeting of the Warrington Town Council, that the Gas Committee take into consideration the question of reducing the price to users of slot meters. He said the Council would remember that in 1906 the price of gas was reduced 2d. per 1000 cubic feet to ordinary consumers. To-day the slot-meter users were paying a fraction under 3s., against the 2s. 2d. paid by the ordinary consumers—or a difference of 35 per cent. He knew there was a difficulty in the way of the alteration of the slot meters; but this could be overcome when the collector went round every quarter, for he could give a discount. The slot-meter people ought to have consideration from the fact that they paid cash in advance, whereas the ordinary consumers had six months' credit. Alderman Pierpoint said the Gas Committee were considering the matter; and as soon as possible the result of the investigation would be put before the Council. He hoped that with this assurance the motion would be withdrawn; and this was done.

REGISTER OF PATENTS.

Carburetting Air.

KING, J., and WORKMAN, H., of Glasgow.

No. 27,145; Dec. 9, 1907.

This apparatus for carburetting air or gas with light hydrocarbon for illuminating, heating, or power purposes, has for its object to provide an arrangement in which the gas is "automatically generated in proportion to the demand, and the strength of the gas can be readily adjusted, and will remain practically constant thereafter for different rates of demand."

The apparatus consists of a vaporizer in which a constant level of petrol is maintained by a float feed-valve, and in which the petrol vapour is kept constantly at a pressure a little greater than that of the finished gas by controlling the amount of heat passing into the vaporizer by means of a governor of any suitable form actuated by the pressure in the vaporizer. Air is also compressed to a constant pressure by any suitable means; and the desired mixture of gas is obtained by a mixing-valve giving the required openings of petrol and air to a mixing-chamber, preferably kept warm—the openings being controlled by the action of a gasholder or governor operated by the pressure of the finished gas itself.

The carburettor may be enclosed in a hot-water or other liquid jacket, with a higher boiling point than that of the hydrocarbon which is to be vaporized; and this jacket may be heated by a burner of the gas itself, after the plant has been started—the light being screwed up or down by controlling mechanism.

The strength of the gas produced may be varied by a hand adjustment of the mixing-valves, which alters the length of the port openings to the mixing-chamber of either the air or vapour, or both; the width of the port openings being controlled by the rising or falling of the gasholder or governor, and thus generating the gas in proportion to the consumption.

Internal Combustion Engines.

BELL, W. T., of Lincoln.

No. 27,473; Dec. 12, 1907.

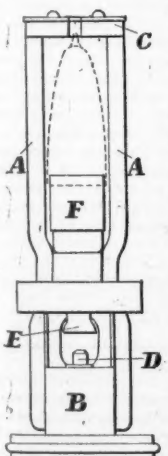
The patentee claims as his invention: In gas and other internal combustion engines: (1) Providing the inlet valve spindle with a link-shaped connection having bearings carrying a swinging link by its axle; (2) connecting to the axle of the swinging link a guide lever, also pivoted to the engine; (3) pivoting to the engine a rocking lever, one end being in proximity to the swinging link to actuate it and the inlet valve spindle, and the other end connected by rods to a cam or other operating mechanism of the engine; (4) pivoting to the engine a bell-crank lever, one member being connected by a rod with the swinging link, and the other by rods to the governor.

Illumination and Heating by Vapour Burners.

DENAYROUZE, L., of Paris.

No. 5030; March 5, 1908. Date claimed under International Convention, March 6, 1907.

Having studied and improved various forms of apparatus for incandescence illumination and for heating with refractory mantles by means of hydrocarbon vapours, and in particular petroleum spirit and benzene, with the object of attaining satisfactory working of the apparatus without any mechanism, the patentee says he has sought to realize this object "by carefully observing the conditions necessary and sufficient for avoiding improper action of the apparatus owing to the deposition of traces, however slight, of hydrocarbons contained in the fuel used and not sufficiently volatile." Such a deposition may, he points out, occur at or near the burner-jet. But these insufficiently volatile hydrocarbons should be prevented from condensing at the moment of issue and stopping the small orifice of the jet, or from being caught as they pass through the capillary wick terminating in the vaporization chamber; for in either case they render the lighting irregular and defective.



Denayrouze's Vapour Incandescent Burner.

For these reasons, he applies to the feeding of incandescence burners with hydrocarbon vapour, liquids that are comparatively little volatile; and they are used in a burner of the kind illustrated. The frame A, situated close to the refractory mantle, is connected in good heat conducting manner with the vaporizing chamber B, and carries at the top a thick plate C. The vapour jet D is co-axial with the funnel E, into which air is drawn freely; the inter-mixture of air and vapour being performed in the chamber F. This burner is a development of those described in patents No. 11,765 of 1900 and No. 9691 of 1903. With such a construction of burner, there can be used a fraction of the heavy and intermediate oils such as may be distilled from the most common coal tars—intermediate oils which distil at temperatures comprised between 140° and 240° C., and loaded with compounds, such as naphthalene, which only distil above a temperature of 200° C. If, then, the distillation is stopped below 200° C., or if the manufactured intermediate oil is distilled fractionally, there is obtained a product, free from naphthalene and the like, which is said to be applicable in a satisfactory manner for illuminating by incandescence. Since the hydrocarbons, however complex, are all transformed into vapours at the orifice of the burner-jet on account of the rapid action of the heat upon the thin layer of liquid brought to the top of the capillary wick, "the light produced is improved, since there is no fouling of the orifice of the jet or any deposit in the wick affecting its capillarity."

But in order that the illumination may be absolutely regular, or the heating flame sufficiently hot and inodorous, there should be removed from the heavy and intermediate oils traces of material less easily combustible—of sticky, tarry consistence—which are carried over by a rapid distillation in the ordinary preparation. Complete safety is, it is claimed, attained by subjecting these oils to a second distillation at a slow speed—for instance, in a suitable refining apparatus. In this manner, the oils may be sufficiently purified "to serve for incandescence illumination and for heating rooms or the like purpose."

Liquid Meters.

PRUDON, E. E. L., of Paris.

No. 6856; March 27, 1908. Date claimed under International Convention, Sept. 14, 1907.

The object of this invention is to improve the liquid meter described in patent No. 6660 of 1908. It was there explained that when the meter is used with motors supplied from atmospheric reservoirs it may happen that the difference of level between the reservoir and the meter will vary, which would to a certain extent falsify the indications of the apparatus; and it was explained that this disadvantage could be avoided by providing before the meter a constant level vessel allowing of obtaining strictly accurate indications.

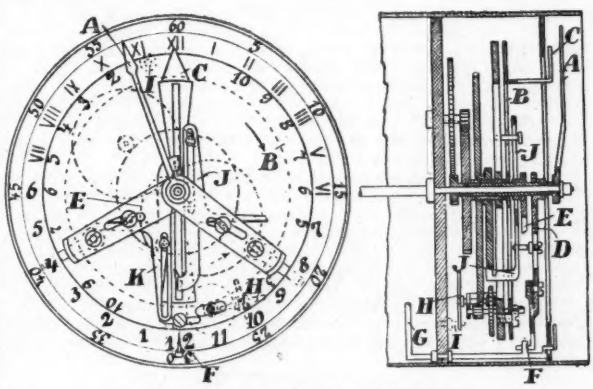
One of the present improvements consists in embodying this constant level vessel with the apparatus itself, and so arranging it above the liquid chamber of the meter as to maintain a constant level of liquid above the passage through which the liquid enters the meter-chamber, and which is controlled by the conical valve-rod. A further improvement relates to the arrangement of the conical valve-rod.

Automatic Igniters and Light Extinguishers.

BRÖNDUM, M. W., of Aarhus, Denmark.

No. 10,715; May 16, 1908.

This device, for automatically igniting and extinguishing lights actuated by clockwork, is of the kind in which, in accordance with the varying hours of daylight, two release arms which may ignite or extinguish the gas-lamps receive an additional movement, as illustrated.



Brondum's Lamp Igniter and Extinguisher.

The *modus operandi* is as follows: The central shaft is turned once every hour by clockwork, and causes the indicator hand A to turn once round the circumference of the inner dial and to indicate similarly to the minute hand of a clock, the minutes. The dial B revolves once in 24 hours, and by its indicator hand C registers the hours, similarly to the hour hand of a clock, if the periphery is divided into 24 hour parts. On the large dial, the Roman characters denote the hours of the day and the Arabic characters the hours of the night. The hands point to 11.57 a.m. The hand D is the igniter, and the hand E the extinguisher. The figures shown on the dial B denote below the igniter the hours of the afternoon, and below the extinguisher the hours of the forenoon. As shown, the device is arranged to ignite at 3.35 p.m. and to extinguish at 7.50 a.m. If, now, the dial B, and along with it the arms D E, be revolved, the igniter D, as soon as the hand C, after 3 hours and 38 minutes, stands at 3.35 p.m., will set free the lever F, after it has first been turned aside. By means of this lever and the release lever G, a spring will be released which, being permitted to turn a given point, will turn, for example, a gas-tap or work an electric switch, or perform a similar action.

If the indicator hand C, after a further 16¼ hours' time, stands at 7.50 a.m., the extinguisher E will release the arm F, after it has first been turned aside, whereby the spring connected with the releasing device is permitted to turn so far that it, for example, shuts off a gas-tap, or performs some similar action.

A wheel H, provided with four pallets, will reach once within twenty-four hours the pin I, engage the latter, which is fixed, and, on account of its further movement, be compelled to make a quarter revolution. A toothed wheel A, which is mounted on the same shaft as the pallet wheel, is provided with eight teeth, and engages with a toothed wheel which has 38 teeth, and is coupled by means of a shaft with another toothed wheel which has nine teeth, and which engages with a toothed wheel provided with 173 teeth. This last-named wheel is connected with an eccentric, on the circumference of which slides an angle of the slide J, which is shifted in a longitudinal slot of the numeral dial according to the rotation of the eccentric. By this manner of gearing, the eccentric, after 4/8 × 38/9 × 173 = 365 2/9 days have passed, will

turn once. Simultaneously with the slide J the angle on the slide K will make a reciprocating movement, by one end sliding along the other side of the periphery of the eccentric. Slides J K influence the igniter and extinguisher, which are caused to traverse a corresponding section of the dial B.

Additions to Gas-Producers.

TANGYES LIMITED and ROBSON, M., of Smethwick.

No. 12,281; June 6, 1908.

These improvements have for their objects to more effectually separate the dust from the gas passing from the generator to the scrubber, and to provide for the removal of the accumulated or collected dust from time to time without interfering with the continuous working of the gas-producer and engines in connection therewith.

The patentees claim: In a gas-producer, the combination with the generator and scrubber of a dust-separator having in connection with it a dust collector or receiver. The dust separator and receiver are arranged between the generator and scrubber and normally communicate with each other; means being provided for closing the communication between them when it is desired to open the latter so as to permit the continuous working of the producer and engine in connection therewith. Between the dust-separator and the dust-receiver is a pivoted valve, with a weighted arm on the externally projecting part of the spindle of the valve and a pivoted catch and projection for retaining the arm in an upright, or nearly upright, position, so as normally to preserve the valve open.

Clock-Driven Recording Apparatus.

SIMMANCE, J. F., of Westminster Palace Gardens, S.W., and ABADY, J., of the Temple, W.C.

No. 13,018; June 18, 1908.

This invention relates to recording apparatus in which a curve is traced on a paper band driven by a clock, whereby the band-driving mechanism is simplified by the omission of parts hitherto considered necessary, the friction of the pen on the paper is reduced to a minimum, the penholder mechanism is adjusted to be in neutral equilibrium in all positions by means of three counter-weights adjustable in three directions mutually at right angles, and the various parts to be manipulated in putting in or taking out the paper band are conveniently accessible.

The clock used is of any well-known type which has as its outer case a cylindrical drum and a central spindle projecting from the ends of the case; the ends of the spindle being fixed to the supporting frame, and the outside case being slowly rotated about its axis. The clock drum drives the paper band, and also serves as the drum on which the recording pen or pencil rests—the paper band being, of course, interposed. The paper band is wound on a storage spool, from which the clock drum gradually unwinds it; the band being passed round the clock drum, and its free end (on which the record has been made) hanging from the clock drum.

To secure sufficient adhesion between the clock drum and the paper band to transmit by tension of the band the force required to overcome the frictional resistance of the storage spool on which the paper band is wound, the patentees utilize the well-known principle of coil friction. For this purpose, one or more rollers mounted on a jointed frame are placed over the band, pressing the latter against the clock drum. The jointed frame is suspended from above, or supported from below, in such a manner that by gravity the rollers give the requisite constant pressure on the band; and so the constant pressure is not sensibly affected by any deviation from absolute accuracy of the cylindrical clock drum.

APPLICATIONS FOR LETTERS PATENT.

27.—FRAME, W. J., "Exhausting gas, &c." Jan. 1.
32.—HORSTMANN, A., G. O. H., E. H., & S., and EDGAR, W. T., "Timing-device for gas-controllers." Jan. 1.
53.—LYNDE, F. C., "Gas-tap." Jan. 1.
71.—ROBIN, J. I., "Mantles." Jan. 1.
76.—PETERSEN, P., "Stopping leaks in pipes." Jan. 1.
90.—HODGSON, J. L., and KENT, W. G., "Regulating and measuring the flow of liquids" Jan. 2.
97.—WILLIAMS, W. H., "Water-service valves." Jan. 2.
109.—WILSON, G., "Prepayment meters." Jan. 2.
132.—HORNSBY, R., AND SONS, LTD., "Suction-gas plant." A communication from Tuxham. Jan. 2.
141.—BEAL, W., "Supporting inverted mantles." Jan. 4.
158.—BLAKEY, J. W., "Intensified gas-lamps." Jan. 4.
174.—MAYER, M., and FEHLMANN, A., "Removing carbon bisulphide from gas." Jan. 4.
210.—SANDVOSS, H., "Temperature meters and regulators." Jan. 4.
235.—BEARD, G. F. H., and DEMPSTER, R. & J., LTD., "Gasholder tank attachments." Jan. 5.
260.—MONROE, W. K, and MURRAY, W. G., "China and glassware for gas lighting and heating purposes." Jan. 5.
284.—CALDWELL, H. M., and SMITH, T., "Governing and regulating the pressure of gas." Jan. 5.
321.—WEISSMANN, G., "Illuminating bodies." Jan. 6.
370.—PEAKE, W. S., "Pyrometers." Jan. 7.
517.—RUTHERFORD, A. E., "Measuring the rate of travel of gaseous bodies." Jan. 8.
524.—SCHMIDT, P., and DESGPAZ, A., "Gas-producers." Jan. 8.
539.—HOWE, W. J., "Automatically discharging waggons." Jan. 8.
588.—EISNER, A., "Inverted burners." Jan. 9.
591.—HATCHER, F., "Gas-stoves for heating motor-houses and greenhouses." Jan. 9.
596.—WILLIAMS, P. E., "Treatment of spent oxide and like material for the extraction of sulphur." Jan. 9.
607.—RATEAU, A. E C, "Gas-turbines." Jan. 9.
629.—BOUR, E. F., "Gas-turbines." Jan. 9.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Livesey Memorial Fund.

SIR,—It is much to be hoped that Mr. H. E. Jones's evident anticipation of a general response on the part of gas companies will be realized; but I hardly like his idea of rated contributions. It seems to me that, as this is in the nature of a purely personal tribute, every contributor—whether individual or corporate—should be left to give freely according to his or their inclination and estimate of the importance to the gas industry at large of the services which it is desired to commemorate. To suggest a uniform rate of contribution appears to invite comparisons which it must be desirable to avoid.

Mr. Jones no doubt hopes, as I do, that he may not be right in assuming that local authorities cannot become contributors to the fund; for I have in my mind occasions when some of our leading corporations generously contributed to objects akin to this one.

CHAS. HUNT.

17, *Victoria Street, S.W., Jan.* 16, 1909.

Fire Insurance Companies as Electric Light Canvassers.

SIR,—Thanks very much for your kind help in the above matter. I may add that, in order to retain the business in question by improving the lighting, we fixed, as samples, some of the Welsbach Company's lamps (No. 5119) with bye-passes. The firm like them, and would put up more; but the Insurance Company object to the bye-pass, unless with an increase of 5s. per cent. on the premium, and the owners naturally object to this. We cannot understand it, unless it is to make the thing so awkward for gas that the Company may get the electric light installed. So far as I can see, there is considerably more risk in lighting up the burners every day with a naked light than in having the enclosed bye-pass.

T. B.

Jan. 15, 1909.

[The references to this subject that appeared in last week's issue were sent to the London office of the Liverpool, London, and Globe Insurance Company; and by the Manager forwarded, he writes to say, to the Head Office in Liverpool. But up to the time of going to press, there has been no further communication from the Company on the subject.—ED. J.G.L.]

LEGAL INTELLIGENCE.

Disputed Charges for Water.

The Magistrates at Torpoint gave their decision last Tuesday in two cases which were before them last month, in which the charges of the Torpoint Urban District Council for water for trade purposes were disputed. The Council summoned two persons, Mr. Richard Wavish, a coal merchant, and Mr. William Rose, a market gardener, for the balance of sums alleged to be due for water-rates. Mr. A. N. Goodman, the Clerk to the Council, stated that in June, 1907, the charges for water were revised, and the new scale came into operation from Christmas of that year. It was decided in the case of trade consumers that the charge should be 1s. per 1000 gallons supplied by meter; but a minimum was fixed at the amount which would be payable had the supply been for domestic purposes. Mr. Wavish occupied premises rated at £26 10s. per annum, and at Lady Day, 1908, he had not consumed a quantity of water equal to the minimum for which the Council could charge. He tendered a sum equal to 1s. per 1000 gallons of water consumed—leaving 8s. 2½d. due. In the case of Mr. Rose, who is a member of the District Council, the sum claimed was £2 7s. 6d. He is assessed in £20 for his house and £67 17s. for farm and market gardens. For the defence, Mr. Pearce, solicitor, contended that under the Public Health Act local authorities were not entitled to make any charges for water supplied within their area beyond those actually required for the expenses of the supply; and that it was illegal to attempt to make a profit out of the water-rate for the reduction of the general district rate. Mr. Goodman argued that this was a rate which was *primâ facie* in order, and that it was the Justices' duty to enforce it. The validity or otherwise of the rate was not a question which could be considered by the Bench as a defence to the present claims. Mr. Pearce also contended there was no agreement between the parties, and said this was tacitly admitted by the Council, who, after imposing a meter-rent, withdrew it on finding that they were not allowed to charge it. To constitute an agreement, there must be a mutuality; and unless the defendants had especially assented to the new arrangement, there was no contract in law which imposed upon them the acceptance of these terms. The charges had been made to render the water undertaking profitable; but this was undermining the provisions of the Public Health Act. The Bench declined to make an order in either case, but granted leave to appeal.

Additional Water Storage for London.—In the course of the coming spring, the large covered reservoir which has been under construction for rather more than ten years at Honor Oak will be brought into use; and it is hoped that the inaugural ceremony may be performed by H.R.H. the Prince of Wales. It covers an area of 21 acres, has a storage capacity of 56½ million gallons, and is divided into four compartments, two of which will hold about 16 million gallons. It will derive its supply principally from the Hampton works of the Metropolitan Water Board; but water will also be obtained from a deep well in the chalk. The undertaking has cost £220,000, inclusive of the land.

MISCELLANEOUS NEWS.

CO-PARTNERSHIP IN THE GASLIGHT AND COKE COMPANY

A Scheme Instituted.

Last Thursday, about 460 of the employees of the Gaslight and Coke Company, consisting of officers and workmen drawn from all departments and all stations of the Company, and representing a total of between 11,000 and 12,000 men, gathered in the large hall at the Chief Offices in Horseferry Road, S.W., for the purpose of having made quite clear to them a co-partnership scheme which the Board are instituting. An abstract report will be found below of the proceedings at the meeting, which was presided over by Mr. Corbet Woodall, the Governor of the Company. The nature of the scheme and its operation are set forth in the following notice which was circulated among the employees.

The Directors feel that the time has now come when the interests of the employees of the Company and of the Company itself should be more intimately linked together than in the past. They have therefore decided to institute a scheme of co-partnership upon the 1st of July, 1909, whereby employees can become stockholders, and thus directly share in the welfare of the Company.

The Company has worked since 1876 under a sliding-scale with regard to the price of gas and dividend, by which the consumers and the stockholders are virtually partners, and are both interested in reducing the price of gas. When the price of gas falls, the dividend goes up; and when the price of gas rises, the dividend falls. This has naturally suggested that a similar principle might be applied in connection with the employees of the Company, so that they also would be directly interested, together with the stockholders and the consumers, in the reduction of the price of gas.

The standard price of gas at present is 3s. 3d. per 1000 cubic feet, and the price charged is 2s. 9d. The scale with the bonus decided upon for the co-partnership scheme is as follows:—

Price of Gas.	Bonus.
3s. 3d.	None.
3 2	½ per cent.
3 1	1 ,, ,,
3 0	1½ ,, ,,
2 11	2 ,, ,,
2 10	2½ ,, ,,
2 9	3 ,, ,,

It is further proposed that, whenever the price of gas is reduced below 2s. 9d., the bonus shall be increased by a greater percentage—namely, ¾ per cent. per penny reduction:—

Price of Gas.	Bonus.
2s. 8d.	3¾ per cent.
2 7	4½ ,, ,,
2 6	5¼ ,, ,,

In order that the employees may as soon as possible become stockholders in the Company, the Directors have decided to place to the credit of each regular employee working under agreement with the Company on the 30th of June, 1909, a special sum equal to a bonus under the scale for two years, or for such shorter period as the employee may have been in the Company's service, calculated, with regard to a regular employee, on his salary or wages at the above date, or, in the case of an employee engaged part of the year at one rate of wages and part at another, at the mean rate of pay between his maximum and minimum rates.

The whole of this special bonus will be entered in the employee's pass-book, and invested in the Company's ordinary stock in the names of Trustees. As soon as the amount thus entered in any employee's pass-book is sufficient to buy £5 worth of the Company's ordinary stock, it will be invested in that stock in the employee's own name.

After this special bonus, and when the amount registered in an employee's name in the Company's stock amounts to £5, then one-half of subsequent bonuses may, at the employee's option, be withdrawn in cash, or may be left in the Company's hands to accumulate at interest.

The Directors are prepared to apply the co-partnership scheme, in accordance with the rules thereof, to all regular employees and to winter hands, on the understanding that they enter into an agreement with the Company, and that they continue to work well and faithfully for the Company. The special bonus will not apply to winter hands.

The idea of the Directors in starting the scheme of co-partnership is twofold—first, that it will open to the employees an easy way of becoming stockholders in the Company and of saving money, and thus improving their position for the future; and, secondly, that it will encourage the employees generally to work, if possible, with even greater energy and zeal than in the past, knowing that, if by care, economy, and good work the price of gas can be reduced, they will themselves directly benefit.

Extracts from Draft Rules.

Bonus to be Absolute Property of Regular Employee.—Pass-Book to show separately Bonus for Investment and Bonus Withdrawable.

5.—On the declaration of the bonus on the 30th of June, 1910, and each subsequent 30th of June, the whole of the bonus to which any employee under agreement, other than a winter employee, may be entitled (see Rule 6 for winter employees) shall become the absolute property of the employee. The whole of the special bonus to be granted on the 30th of June, 1909 (all of which must be invested), and all subsequent bonuses, shall be entered in the pass-book with which each co-partner shall be provided, and accumulated and invested in the Company's ordinary stock in the names of three Trustees until such time as these amounts are sufficient to purchase him at least £5 ordinary stock of the Company in his own name. Subsequent to this, one-half must be separately entered in his pass-book and invested in the Company's ordinary stock, either in his own name or on his behalf in the names of three Trustees. The other half shall be entered separately in the pass-book, shall be payable in cash, or may be left at interest, and may then, with any accumulation thereof, be withdrawn in whole or in part at any time upon giving not less than seven days' notice on a form provided for the purpose. If not withdrawn, this portion of the bonus will remain in the Company's hands to accumulate at 4 per cent. interest. Under no circumstances whatever, except fraud, shall the bonus, or any part or any accumulations thereof, whether in the hands of the Trustees or in the name of the employee, be forfeited.

Winter Employees.

6.—Winter employees, under agreement, shall be entitled to an annual bonus on the 30th of June, 1910, and on each subsequent 30th of June, if and when they return in the following winter, and provided they leave the withdrawable half on deposit with the Company, the other half being invested in ordinary stock of the Company in the names of the Trustees on their behalf. If, however, they choose to take the withdrawable half in cash, they are at liberty to do so; but in that case they will not be entitled to the other half invested in stock. Winter employees who leave the withdrawable half of their bonus with the Company, and who do not return the following season, can, on application to the Secretary, obtain payment of the same.

Committee.

12.—There shall be a Committee of Management consisting of the Governor of the Company, who shall be *ex officio* Chairman of the Committee, 18 members elected by nomination of the Directors, and 18 members elected by ballot by the co-partners, and who have been five years at least in the employ of the Company. One-third of the members of the Committee shall retire by rotation every year, but be eligible for re-election, six of whom shall be Directors' and six employees' nominees. Seventeen members shall constitute a quorum; and every resolution to be binding at such meeting shall have for its support a majority of the members of the Committee present and voting upon the resolution.

Mr. Corbet Woodall's Address.

The GOVERNOR, in opening the proceedings, remarked that in the long history of the Gaslight and Coke Company, he did not think there had been any episode more interesting than that which had gathered them together there that afternoon. Certainly, this was the first time in the history of the Company that representatives of all departments of the Company's operations, with the chief officers and the Directors, had met together to consider interests which were common to them all, and which were recognized as being mutual, with the object of benefiting the whole. The scheme to be considered that day would, it was hoped, have a double effect—*i.e.*, be of advantage to the Company by stimulating to greater energy, intelligence, and zeal on the part of the staff, and be of advantage to the employees, by providing a means whereby they would be able, more easily than was the case at present, to make provision for the time when it was no longer possible for them to work. As most of them were aware, the profits which the Company might divide were regulated by Parliament, according to the price charged for gas. As the price was reduced, so the dividend might be raised; and if the price were raised, the dividend must be reduced. In this way, the consumers and shareholders were brought into a condition of partnership. They were equally interested in the supply of gas at a low price; and what was good for one was good for the other. Into this principle, they proposed to introduce the body of workers for the Company. It would be a tripartite union of interests. Consumers, shareholders, and workers would be alike concerned in, and profited by, a low price of gas.

THE POSITION OF THE EMPLOYEES.

Of course, the Board recognized perfectly that the workman was not a capitalist, and that he could not, as the capitalist could, live through a bad year on the accumulations of good years that had passed. The workman must have his daily living wage; and this was in no jeopardy by any arrangement that was being proposed that day. What would happen would be that if the Company had bad times, and the price of gas had to be raised, then the pinch would be felt by a reduction in the amount of the bonus. The Board did not propose to make any alteration whatever in the conditions under which the Company was managed and controlled, or in any of the relations which existed between the workmen, the Board of Directors, and the staff. With regard to wages, these would be dealt with according to the same principles that governed them at the present time. Also the hours of labour, the character of the work, the holidays, and the pensions would not be in any way affected as a result of the scheme. What was proposed was to add to existing arrangements something entirely new.

THE FIRST BONUS.

It was not the intention to delay the payment of a bonus under the co-partnership scheme until there had been a further reduction in the price of gas. They took as the starting point the figure of 3s. 3d. per 1000 cubic feet, which was the present standard price by which the dividend was governed. As the Company were now supplying gas at 2s. 9d., there was a difference of 6d. For each of these pennies from 3s. 3d. down to 2s. 9d., it was proposed to add to the wages ½ per cent., or 3 per cent. in all. Beyond this figure, the intention was to add ¾ per cent. to the wages for every penny reduction. So that when the price was lowered to 2s. 8d., the rate of interest would be 3¾ per cent.; and when the charge was 2s. 6d., the rate would be 5¼ per cent. The first bonus to regular employees would be paid on June 30 next; and it would be for a period of two years—the scheme would be calculated as if it had commenced on July 1, 1907. When the bonus was declared, the amounts due to each employee would be entered into his pass-book, and the whole amount would be invested in shares in the Company. If the sum reached or exceeded £5, the employee would receive scrip or a certificate in the stock of the Company for the amount, and his name would at once be registered as a shareholder.

Thus he would become a co-partner. But if the amount was less than £5, it would be invested in the names of three Trustees, and would continue to grow until it reached £5 or more, when it would be taken out of the names of the Trustees and invested in that of the employee. So long as it was in the hands of the Trustees, it would bear interest at the rate of 4 per cent. per annum; and the interest would be entered up in the pass-book from time to time. After the first bonus, and when the amount registered in an employee's name in the Company's books was £5 or over, then one-half of the subsequent bonuses might, at the employee's option, be withdrawn in cash, or might be left in the Company's hands to accumulate at interest. It was in this way that the co-partnership idea would be realized. The employees would be no longer simply receivers of weekly or monthly pay, but would also be participants in the profits realized by the good conduct of the undertaking.

GROWTH OF CO-PARTNERSHIP—COMPANY'S PENSION FUND.

The application of the co-partnership system to gas companies was first suggested by the late Sir George Livesey, who was a man not only of ideas, but of energy to apply them. So it happened that in the case of the South Metropolitan Gas Company the scheme had been a working and beneficent fact for some twenty years. It was also in operation now with some other companies. As a result, there was invested in this way in the gas undertakings of London and the suburbs more than £400,000 of capital, bringing in an income of nearly £20,000 per annum; and this sum was growing at an increasing rate year by year. It was this scheme that he (the Governor) and his colleagues had decided to offer to the employees of the Company that day. There were several reasons why the adoption of the plan had been delayed. In the first place, the Directors wished to see it fairly tried elsewhere. This had now been done. The system that he had been explaining had been fully tried by the South Metropolitan Gas Company, with satisfactory results; and the reports from other quarters in which it had been adopted were equally good. Then their Company were not in possession of abundant funds; and the scheme could only be started with the help of a considerable amount of ready cash. The third reason was that their pension fund was growing larger and larger, and they were not certain whether they could afford both. As to the pension fund, they were aware that it was the custom of the Company to pay pensions to men reaching the age of 65 who had been in their service for the last fifteen years; and these pensions were at the present time costing the Company about £50,000 a year. There were many hundreds of families of old servants who were living in comfort and content upon them. But even with the pensions there was something wanting. Of course, they came to an end on the death of the pensioner; and consequently there was nothing left to keep the widow or others who were left behind him. This defect would be remedied by the new scheme; for when a man died what he had accumulated would be available for those he left. On the subject of pensions generally, he believed that the scheme recently introduced by the Government was an altogether good one, and that it had brought into thousands of homes a degree of comfort to which they had hitherto been strangers. They, however, commenced at rather a late age. Those who reached 70 years and received a pension, had gone through much hardship before doing so. In the case of their own Company, they did not necessarily wait till a man was 65. If he was not fit for his work, he had his pension before that.

WHAT CO-PARTNERSHIP SHOULD DO.

If the co-partnership scheme operated for the benefit of one side only, it would be a heavy burden, and would tend to hinder reductions in the price of gas; but the action the Board had decided upon showed that they did not believe this would be the result. They would cast their seed upon the waters, assured that it would not fail to germinate and bear fruit to the advantage of the sowers as well as of the reapers. Many asked what influence an individual workman could have on the prosperity of a great company. But it was a common-place to say in reply that the successful working of the whole was only possible if its component parts were in good order. Many—he believed most—of the employees of their Company were doing yeoman service, and giving their best; and no more could be asked of them. But this could not be said of all; and what the Board desired was that there should be a levelling upwards—that the duffers might strive to increase in intelligence, that the shirkers might be ashamed, and that every man might feel that he was honourably bound to do that of which he was capable. This scheme would, they believed, make men think; and if they did this, they would see the reasonableness of what he had said. It was not the idle or slothful worker whose days were the happier; and he hoped this new departure would have the effect of creating greater interest in the work, and a higher average of efficiency. With some men there was a feeling that they were gainers in proportion as they gave little return for their pay; but it was as mean to defraud an employer of part of that for which he had paid as would be the coarser sin of picking his pocket. In the "Spectator" for Jan. 2, there were some notes of comment by the Editor on a speech delivered by Lord Rosebery on "Thrift and Waste." This was one of them: "Unless a man has saved something, he cannot be, or feel himself, a free man. The man who has nothing put by, but lives merely from week to week, is always at a disadvantage, and cannot exercise that choice and independence in action which are the essential marks of a free man. Both in the case of his employer and of those from whom he buys, he is very often bound to take what is offered rather than what he would like. If, however, he has £100, or even £50, put by, his freedom and choice of action are greatly enlarged, and he can take advantage of any opportunity that is offered him." He (the Governor) could not hope to improve upon these admirable words. The Directors appreciated the difficulty of saving money out of a weekly wage, especially where there was a family; and yet it was possible, with perhaps some little self-denial, to make savings. The Board had been asked, "Why make this new departure?" "Do the men ask for it?" "Is it necessary?" The reply was that the system of profit-sharing had certainly not been suggested by the employees, and was not necessary to meet any discontent with the present conditions of service. There never was a time when, so far as the Directors knew, there was greater content and satisfaction with these conditions. While they did not offer the plan as an act of beneficence, they saw in it a means of improving the status and the outlook of those who served the Company, and gladly availed themselves of it. A large number of men in their service had spent their whole working lives with the Company; and it would be strange indeed if the Directors were not concerned for their well-being. The Board took a deep interest in their co-workers for the Company, and were pleased to have an opportunity of showing it. The accumulation of capital was slow work; and therefore the sooner it was commenced, the better. The new plan must not be expected to do more than it professed. It simply laid a foundation upon which the employees were to build; but it was remarkable how rapidly the building grew, if the builder was thoroughly in earnest. At the same time, the co-partnership system was a business proposition. It was offered to the employees as an incentive to better and more earnest work. The Directors asked them to be content with nothing less than the best, and to make the scheme, not a clog on the progress of the Company, but a stimulus to greater prosperity in which they would all share.

Mr. ULICK J. BURKE emphasized the fact that the well-being of the employees was a matter of deep concern to the Board, and referred to the question of how one man in a big concern like theirs could affect the well-being of the whole. He said that the best thing they could possibly do for the benefit of this great undertaking would be to realize that it was, in a way, one large machine; and the well-being of a great machine, as they knew, must depend entirely upon its component parts. What was wanted was a long pull, a strong pull, and a pull all together.

VOTES OF THANKS.

Mr. D. MILNE WATSON (the General Manager) proposed—"That the representatives of the various sections of the Gaslight and Coke Company's employees present at this meeting, having had explained to them the system of co-partnership proposed to be adopted, tender to the Directors their grateful thanks for the same, and pledge themselves to do all in their power to render it as beneficial to the Company as to themselves." The Company, he said, had already done a very great deal for the men, and now they were adding this co-partnership scheme. It had been said that it was strange the Directors should have given this in a time of peace. But that was the proper time to give it. It was not in periods of trouble, when the air was full of misgivings and doubts, that one wanted to come forward with a scheme of this kind, but rather in times of peace like the present, when the Company had a prospect of progress before it. The shareholder might make himself perfectly easy in his mind; for the employees intended to return him, if they could, cent. per cent. for his money.

Mr. GEORGE WITHERS (a Beckton workman), in seconding the proposal, remarked that in the history of the Company they had already one landmark, which took them back to 1889, when the Board gave them an eight-hour day, and many other concessions; and now another landmark was being made.

Mr. H. RAYNER (the Secretary), speaking more particularly on behalf of the officers, briefly supported the resolution, which was carried without a dissentient, and amid loud and continued applause, after the Governor had replied to various questions of detail asked by some of those present.

Mr. T. GOULDEN (the Chief Engineer) then moved a vote of thanks to the Governor and Court of Directors for their presence at the meeting that day, at which the details of the scheme had been so carefully explained.

This was seconded by Mr. SMITHERS (a workman), supported by Mr. F. W. GOODENOUGH (the Chief Inspector), and at once carried unanimously.

The GOVERNOR acknowledged the vote; and the proceedings terminated with three hearty cheers for him and the Directors of the Company.

The officers and workmen present at the meeting were subsequently entertained at tea.

THE EDINBURGH AND LEITH GAS ORDER.

An Official View of the Measure.

The Committee of the Edinburgh and Leith Gas Commissioners who had charge of the promotion of the Provisional Order which was recently approved by Parliament, have prepared a report to the Commissioners, which is of interest in view of the criticisms of the measure by our Edinburgh Correspondent which have appeared in the "JOURNAL."

The Committee narrate the initial steps which were taken in connection with the Order, and go on to state that on July 8, 1908, they considered notes by the Secretary for Scotland, and adjusted replies to be made thereto. On the 10th, the Committee met Counsel for the Secretary for Scotland, and went over the notes and replies, and were asked to take the Commissioners' instructions (1) whether they would agree (*a*) to accept an Auditor to be appointed by the Secretary for Scotland, (*b*) to all gas consumers having a right to appeal against the annual accounts, and (*c*) to the period for presenting appeals being extended to three months; (2) that the period for extension of works should be reduced to ten years in place of the twelve asked in the draft Order; (3) that there should be an actuarial examination of the superannuation scheme immediately on the passing of the Order; and (4) that the model clause as to gas pressure should be adopted. The Finance and Law Committee acceded to these requests on July 13.

Then account is given of the inquiry in Edinburgh before the Commissioners appointed by Parliament, at the end of July, and of the finding of the preamble proved by the Parliamentary Commissioners; and the report goes on to state that the Scottish Office London officials having sent down a print of the Order with their notes thereon, and having desired the attendance in London of the Commissioners' officials to go over the notes, the Conveners of the Finance and Law Committee and of the Works Committee were instructed to attend to the

matter, along with Mr. W. R. Herring (the Engineer) and Mr. J. M'G. Jack (the Clerk). Two visits were paid to London; and a Confirmation Bill was introduced into the House of Lords, the Royal Assent to which was given on Dec. 21.

After remarking that several amendments and alterations were made in the Order after it had left the hands of the Gas Commissioners, the Committee say:—

In clause 6, a proviso was added: Provided that the Commissioners shall annually set apart as a sinking fund for the payment of money borrowed under this Order for the purpose of the redemption of annuities such a sum as will, with the accumulated interest thereof, repay money so borrowed within thirty years from the commencement of this Order.

The meaning of this clause is that the money borrowed for the redemption of the annuities must be repaid within a period of thirty years from Dec. 21, 1908. The original sinking fund was 15s. per cent. per annum; whereas the thirty years' redemption of the money borrowed for the purposes of their extinction practically represents a 2 per cent. sinking fund. The apparent increase in the sinking fund contribution is not as great as it appears at the outset. The amount which the Commissioners contributed to the annuity sinking fund for the year ended May, 1908, with interest, was £14,248 1s. 11d. The 2 per cent., on the estimated amount of money to be borrowed for the purpose of the redemption of the annuities, amounts to £14,932. The Committee pointed out to the Scottish Office officials that their proposition would, in all probability, render the redemption of the annuities impossible, for instead of relieving the financial burden on the undertaking, the provisions of clause 6 would, in all likelihood, make the scheme financially impossible. After considerable discussion, it was, however, seen that no progress could be made in obtaining better terms; and the next point at issue was proceeded with.

Clause 7 is an entirely new clause, and reads as follows: The Commissioners shall from and after the commencement of this Order for the purpose of meeting any deficit on the sale of the disused works of the Commissioners referred to in section 9 of the Order of 1902 contribute in each year from the revenues of the gas undertaking such a sum as will over each period of five years taking one year with another average an amount calculated at the rate of not less than two pence for every 1000 cubic feet of gas sold in each year and the Commissioners may in addition to the said purpose also apply the said sum or any part thereof from time to time for the redemption of annuities and the repayment of borrowed money.

The above clause was drafted by the Committee to meet views previously expressed by the Scottish Office officials, and formed the subject of very considerable discussion. The whole question hinged upon the more rapid liquidation of what might be termed the dead capital debt on the undertaking; and the Commissioners were asked to contribute to the extent of 4d. per 1000 cubic feet to the reserve fund for that purpose. The serious imposition of such a tax on the present-day consumers was pointed out to the Scottish Office officials; and the obligation to contribute such a sum was considered to be a burden which the undertaking could not carry, particularly in view of the competition to which it was subjected, and the commercial conditions with which it had to cope. After considerable discussion, the Committee postponed the consideration of the provision, as it was necessary to refer to the data of the undertaking, and to come to a conclusion as to the commercial future that had to be faced.

Mr. W. R. Herring prepared the following memoranda, showing the results of his consideration of the matter; and the Committee met and considered the question, and then continued the discussion with the Scottish Office. They submitted in draft clause 7, which, after considerable discussion, was accepted by the Scottish Office officials.

Memoranda Relating to Special Depreciation Fund.

The Scottish Office representatives whom the Commissioners met were very desirous of imposing upon the Commissioners compulsory obligations to contribute largely to the reserve funds, and pointed out the fact that Glasgow had been so doing for many years past, to the extent of nearly 2d. per 1000 cubic feet, to special depreciation of works and plant funds. On behalf of the Commissioners, it was pointed out that they had only been a corporate body since 1888, whereas Glasgow had been so since 1870; that immediately upon the inception of the Commission, the coal boom of 1890 and 1892 depleted their resources, notwithstanding their having to increase the price of gas; that in 1897 their circumstances were such that heavy constructional expenditure had to be incurred; that it was not until 1904 that they began to have any moneys to spare for such a purpose; and that they forthwith proceeded to contribute more largely by increasing the expenditure under the heading of repairs and maintenance. To this extent, therefore, they have been contributing to the financial reserves of the undertaking, though not in the same way that Glasgow were doing.

Amount Charged to Repairs and Maintenance Account per 1000 Cubic Feet.

	Edinburgh. Pence.	Glasgow. Pence.
Average for preceding six years . . .	2·57	2·51
1905. . .	3·00	2·18
1906. . .	4·35	2·46
1907. . .	4·55	2·37
1908. . .	4·43	2·56

It will therefore be seen that Edinburgh has already been contributing, though in another way, a sum nearly equivalent to what Glasgow apportion to a special depreciation fund.

We need not go into the facts as to the lower-grade gas which Glasgow has habitually supplied, and consequently their lower costs for manufacturing material; nor the fact that Glasgow, though 3½ times bigger than Edinburgh, has only 434 miles of main pipes as compared with Edinburgh's 417. In other words, Glasgow has 590 consumers on each mile of pipe, whereas Edinburgh has only 221. Glasgow also sells 22,187 cubic feet per consumer, against Edinburgh's 18,522. All of these figures have an important influence upon the finances of the undertaking. Glasgow is also more fortunately situated, so far as rates and taxes are concerned, to the extent of nearly 1d. per 1000 cubic feet; and the amount per 1000 cubic feet contributed to the sinking or redemption funds in Edinburgh is twice as much as in Glasgow—viz., 2·75d. per 1000 cubic feet, as compared with Glasgow's 1·85d.

The Commissioners quite approve of the Glasgow policy, and went so far in their Provisional Order of 1902 as to make due and proper provision for the more rapid liquidation of what might be termed the dead capital of the undertaking, and referred the Scottish Office authorities to clause 9 of the 1902 Act, which provides for a contribution of such an amount of money as will liquidate any deficit that may arise as between the value of the old works in the books of the Commissioners at the time of their sale, and such sums as may be obtained therefor; such liquidation to take place within a period of fifteen years. A statement was communicated to the Scottish Office authorities pointing out that this dead capital amounted to a sum approximating £250,000, and that it would practically represent a contribution of 2d. per 1000 cubic feet on the price of gas over the period of the fifteen years in question. The clause making the above provision does not become operative until the sale of the old works is accomplished.

The Commissioners have voted the surplus balance of each year's operations since 1904 to the reserve fund, as follows:—

1904	£5020 15 8
1905	432 0 0
1906	660 9 0
1907	909 1 0
1908	3110 11 5

In addition, by a special resolution passed on July 27, 1908, they instructed the Engineer to make an allowance of £10,000 as a contribution to the reserve fund in preparing his estimates for fixing the price of gas in the following years. This £10,000, therefore, together with the surplus balance already set aside, amounts to very nearly the sum of (say) 2d. per 1000 cubic feet necessary to liquidate the £250,000 of dead capital in the fifteen years provided for in the 1902 Order; and so far as one can forecast the future, it appears that the Commissioners might reasonably come under an obligation to immediately commence to contribute for the purposes mentioned in the clause already referred to. But whether they would be justified in coming under a heavier obligation than those already enumerated, is a matter for their mature consideration; and the conference was therefore adjourned to permit of investigations being made, and a sound conclusion come to.

The on-costs, as represented by interest on annuities, mortgages, and contributions to sinking fund, stand in the relative position as between Edinburgh and Glasgow as follows:—

	Edinburgh. Pence.		Glasgow. Pence.
Annuities and interest on loaned capital . .	9·85	..	3·50
Additions to funds out of profits (depreciation)	—	..	2·23
Amount carried to reserve fund	·70	..	—
Sinking or redemption funds.	2·72	..	1·77
Total	13·27	..	7·50

It will thus be seen that the Edinburgh gas consumer is already taxed to an extent amounting to nearly 6d. per 1000 cubic feet more than the Glasgow gas consumer; and with the proposed additional burden, it will be 8d. per 1000 cubic feet more. The question is, therefore, whether the Commissioners would be justified in taxing him to a greater extent than the present statutory provisions provide, in order to liquidate the capital value of an undertaking whose life is considerably longer than the period of liquidation now provides for.

I do not for a moment think that any obligation should be incurred that might have the risk of increasing the cost of gas to the consumer. The consumer is already entitled, and has been promised, a moderate reduction in consequence of the change of methods to be adopted in the process of manufacture; and what has to be considered is whether the surplus remaining would permit of the Commissioners acting up to their present obligations, *plus* the proposed additional obligation imposed upon them at their own suggestion in 1902. This question is very much involved, and wholly depends upon the commercial possibilities of the future; and it is upon this prospect alone that the Commissioners can determine their policy in this respect. So far as the past is concerned, we find that the price of coal can vary during a period of five years to the extent of from 8s. per ton to 15s. 5d. per ton, and that the difference between the present normal price and the maximum that has been within the past eight years adds to the cost of manufacture for coal alone 6d. per 1000 cubic feet above the normal. The coal bill represents half the annual expenditure.

So far as one is able to forecast future commercial conditions, there is a tendency for the normal price of coal and other materials to increase rather than decrease. Projected legislation controlling the hours of labour in mines, and precautionary restrictions on this and similar industries, all have a tendency to increase the cost of materials. Legislation affecting labour, and the present powers which labour can bring to bear, are continually being exercised to increase the cost of production; so that while labour is able to compensate itself for the increasing cost of normal necessaries, the Commissioners must bear in mind the fact that they cannot contemplate increasing the cost of gas to the consumer without seriously threatening the commercial stability of the undertaking.

Then, again, taking the revenue side of the undertaking, our receipts for products can vary for sulphate of ammonia to the extent of 1¼d. per 1000 cubic feet as between the minimum that has been and present-day normal prices. The sale of coke has varied within the past six years to the extent of 2·85d. per 1000 cubic feet on the receipts; and while the conditions foreshadowed with regard to the price of coal would have a hardening tendency on the prices of coke, it is important to bear in mind that variations in the market prices of material within the past few years have been such as to increase the cost of gas by 1d. per 1000 cubic feet. We have further to consider that the increasing of our surplus profits by contributions to the reserve fund, &c., also increases our local and imperial taxation.

It does not, therefore, seem to me that the Commissioners would be justified, in the interests of the business as a commercial concern, in undertaking any heavier obligations than they are at present required to discharge.

Clause 10, the Committee remark, is an entirely new one, providing for an annual return to the Secretary for Scotland, with respect to sinking fund, &c.; and they then go on to enumerate the alterations in the superannuation fund and other clauses.

PUBLIC LIGHTING OF MARYLEBONE.

The Substitution of Electricity for Gas.

At the Meeting of the Marylebone Borough Council last Thursday, the subject of the substitution of electricity furnished from the municipal generating station, for gas supplied by the Gaslight and Coke Company, for the lighting of certain streets of the borough, which was dealt with in the "JOURNAL" for the 22nd ult. (p. 818), was again under discussion, on the adjourned motion in regard to borrowing the necessary money.

Messrs. S. Pontifex and Co., the Contractors for the lighting, maintenance, &c., of the gas-lamps, wrote expressing regret at the decision arrived at at the previous meeting, and stating that they were quite agreeable to the Council paying *pro ratâ* for each lamp substituted up to and including the date upon which the firm last lighted it. They pointed out that their liability would cease as soon as the Electricity Department opened the ground round the columns and commenced alterations from one system to another. With reference to the letter from the Gaslight and Coke Company on the matter, already given in the "JOURNAL," Messrs. Pontifex took strong exception, in another letter, to the statement in regard to the lighting and maintenance of the gas-lamps being in the hands of a third party, and protested against the suggestion, "however delicately inferred," that they had sacrificed the efficiency of the lighting to monetary gain. They said: "It is quite true that our contract yields us a profit, not by any means a large one, without which your Council would not expect us to do the work, any more than they would believe that the Gaslight and Coke Company, with due consideration for their shareholders, would work entirely for the credit of gas lighting, or would wish that the Council's Electrical Department should supply current without getting a proper return upon the expense, by no means small when labour is involved, upon the distribution; but we do claim that your work has been more efficiently and economically (as reference to other districts will prove) carried out than any under the sole control of the Gas Company—a statement which can be justified by a visit of your Lighting Committee to any adjoining borough."

The Lighting Committee, in their report on the matter, expressed regret that the Gas Company's letter had not been received earlier, so that they might have reported upon it before the Council resolved to adopt electric lighting for the public lamps; but they saw no reason now for disturbing the resolution passed on the 3rd of December. The Committee pointed out that they could not have recommended the Council to enter into an agreement for five years as suggested by the Company.

The Electric Supply Committee, in their report, pointed out that the Gas Company had the chance of taking over the maintenance of the lamps when Messrs. Pontifex were appointed Contractors; and they then proceeded to make the following remarks in regard to the general subject: "It is easy for the Gas Company, knowing the price quoted by us, to make a lower quotation; and it is not surprising they should do so, in view of the fact that it is now pretty clear that, apart from the capital expenditure required for the conversion of the lanterns and connecting up to the mains (the interest and sinking fund on which is included in our tender), the lighting of the streets can be more economically done by electricity than by gas. With regard to the statement of the Gas Company that the present gas-burners should be capable of giving 70-candle power, we have to say that we are not aware that in any of the other districts of London is the efficiency of the incandescent gas lighting better than in Marylebone, and that the tests applied were made by an independent engineer. As to the desirability of the Council lighting the public streets by their own electric supply undertaking, we ought to state that the capital expenditure to be incurred will be paid off within ten years, and that the profit to the undertaking will then be considerably increased. The price we proposed to charge the Council (which was included in our offer to do the public lighting for an inclusive annual payment of £8650) was at the ordinary tariff—viz., 8d. per unit for 500 hours, and 1d. per unit afterwards. We thought it very undesirable that the lighting of the streets should be done at lower than the ordinary tariff; but we find that the Council are entitled to be treated as one consumer in respect of the whole 1964 public lamps, and, like other large consumers, be allowed a discount of 25 per cent. for prompt payment. This will reduce the annual sum payable by about £1300; so that although the Council have agreed to our lighting the public lamps for the inclusive sum of £8650 per annum, the amount we propose to charge will be £7350 per annum. We also desire to point out that it is only within the last twelve months, owing to the better manufacture of metallic filament lamps, that it has been possible for electricity to compete successfully with gas. Moreover, it is quite possible that within the next few years even more economical lamps may be manufactured. But if the Gas Company's proposals are accepted, the Council will be bound for five years, and thus prevented from availing themselves of further improvements. With regard to capital expenditure, a difficulty has been anticipated with the London County Council. But we cannot see, in view of the figures stated, that the County Council can reasonably withhold consent to the necessary loan; and if they do so we must appeal to the Local Government Board."

On the recommendation of the Electric Supply Committee to borrow £8000 for the proposed conversion of the lamps,

Mr. E. R. DEBENHAM, the Chairman of the Committee, said the subject had been thoroughly discussed since the last meeting of the Council, when the proposal to borrow £10,000 was referred back for further consideration. The Committee had come to the conclusion that it was not necessary to go to the expense of remodelling the lamps, being of opinion that the existing ones would serve very well. With this in view, they had amended their original estimate, and had decided to treat the Council as one consumer; and they were prepared to carry out the work at about £1300 less than they originally estimated. This was some £1500 lower than the existing gas contract; and even if they considered the Gas Company's new offer, it would still be some £600 cheaper. The capital expenditure to be incurred would be paid off within ten years, and the profit to the undertaking would then be considerably increased. If within the period named they had their mains in all the streets, he thought that £3000 instead of £1500 would be the saving.

Mr. GARROULD, commenting on the letters received from the Gas Company, said he did not think the Council had treated the Company so badly and disrespectfully as they maintained. They had been dealing with the Company for many years, and, after all, they were only like any other contractors. They had in the borough a number of contractors who were large ratepayers, and at the termination of their contract he had no knowledge of these contractors coming forward and complaining of being unfairly treated. The Company had also mentioned that the Special Committee appointed to consider the question had upon it the Chairman and two other members of the Electric Supply Committee—a majority of its members; and they seemed to think this was an injustice to them. He contended that gentlemen did not go on these Committees for their own ends, but to do what was best in the interests of the ratepayers.

The MAYOR (Alderman Hopkins) reminded the speaker that the question before the Council was not one of substituting electricity for gas, which had been settled, but of borrowing money.

Mr. GARROULD said it had been stated that the light proposed to be given by the Committee would not be so good as that afforded by the Gas Company. But he was of opinion that it would be better; and there was not the slightest doubt that it would be cheaper.

Lieut.-Col. A. M. MAUDE moved an amendment to refer the matter back. He said the Electric Supply Committee, in drawing up the recommendation, had been guided by the Gas Company's estimate. His principal reason for desiring to refer the matter back was to see what profit the Committee were really going to make out of the transaction. In his opinion, it would be necessary, if the scheme was carried out, that new electric mains should be laid in every street.

Alderman MARTIN MORRIS seconded the amendment. He said these matters were generally brought forward in a hurry; and he contended that what had been done was not quite fair to the Gas Company. He should have liked the Council to accept the Company's offer. They had been doing their work for many years; and he did not see why the Council should take the cream of the borough and let the Company have the bye-streets, which did not pay.

Alderman J. ANGLIM, speaking from the ratepayers' point of view, said the Council ought to be glad to accept the Committee's offer. He had no complaint to make against the gas lighting of the borough, for he thought it was the best lighted borough in England. The Council were not in a position to send the matter back, for their contract would end shortly, and if nothing was settled they would be in a fix.

Mr. DENNIS contended that the lighting of the streets should be done by fair competition, and sealed tenders invited.

Mr. A. H. D. NONWEILER, the Chairman of the Lighting Committee, said the Electricity Committee had offered to undertake the whole cost of the conversion and maintenance, and the Special Committee having considered the proposal and adopted it, it was too late to discuss it now. They had a figure of £8300 from the Gas Company for carrying out the same work that the Committee proposed to do for £7300 a year. From the ratepayers' point of view, this meant a saving of £1000 a year. They were at present paying £8800 a year for work which it was now proposed to carry out for £7300; so that the ratepayers would benefit by £1500 a year. He was of opinion that they should take the money out of the reserve fund, and not go to the County Council for it.

Mr. DEBENHAM having briefly replied to the points raised, the amendment was put, and was lost by 20 votes to 17. On a division being called for, the figures were returned as 26 against and 17 for the amendment. The recommendation was then agreed to.

BRADFORD CORPORATION PROPOSALS NEGATIVED.

The Bradford Corporation gave notice of their intention to promote two Bills in the next session of Parliament—one dealing with gas, water, and electricity, and the other being a General Powers Bill, which contained clauses referring to the rating of unoccupied houses and land. Much opposition has been manifested from time to time on the part of property owners, tradesmen's associations, and others to certain of the proposals contained in the measures; and when the statutory meeting of ratepayers was held last week to consider them, some lively passages took place. A feeling of extreme hostility to the Bills was displayed; and in the end the motions "that they be proceeded with" were defeated by overwhelming majorities.

The Council Chamber was selected for the meeting; and the "Yorkshire Observer's" report of early events was in the following terms: "Long before the proceedings began, a large body of working men—said to be Corporation employees, and to number over 250—installed themselves in the Council Chamber, and something under 70 seats were left vacant. These, with the exception of a few reserved for officials, were quickly filled, chiefly by representatives of the opposing Associations; and thereafter policemen at the Town Hall entrance met arriving ratepayers with the announcement 'No room.' Mr. H. B. Ratcliffe, an ex-Alderman of the City Council, with a wave of his hat in the direction of the gallery, asked those who worked for the Corporation to hold up their hands. What appeared to be a majority of the persons present responded. 'Now we have you,' said Mr. Ratcliffe triumphantly. An occupant of the gallery replied by asking all those who were members of the Chamber of Trades to hold up their hands; and the appeal receiving scanty notice, remarked, 'You dare not show.' 'Corporation workmen,' he added, 'have just as much right to be present as you have'—a statement received with loud applause. Mr. Ratcliffe replied that the Corporation paid men to work, not to stop there; and the gallery champion remarked, 'If there's a clique on one side, there's a clique on the other.' However, the difficulty with regard to the accommodation was overcome on the arrival of the Lord Mayor (Mr. James Hill), who announced that, as there were as many people outside who wanted to attend the meeting as there were inside, an adjournment would be made to the Mechanics' Institute. Here

sallies by the rival parties were once more indulged in, which led the Lord Mayor to exclaim, 'We have tried to be fair all round."

Coming to business, the Gas, Water, and Electricity Bill was taken first; and it was agreed to consider every clause, from No. 1 to No. 50, separately. The adoption of the first clause, setting forth the title of the Bill, was forthwith moved, and defeated by a big majority. The Lord Mayor then announced that, as the meeting was in favour of dropping clause 1, this meant practically that the Bill was lost—a statement which was received with loud and prolonged applause. Subsequently it was decided to rescind the resolution to deal with each clause separately; and the adoption of the Bill as a whole was moved and seconded. Further discussion then ensued, in the course of which Mr. Crawshaw, of the Bradford Ratepayers' League, declared that a more preposterous Local Bill had never been submitted to a body of electors; and he hoped, if need be, their opposition would be carried to Parliament, and that they would insist that their rights should not be taken from them until those rights were taken away from ratepayers all over the country. On being put to the vote, this resolution also was defeated.

The consideration of the General Powers Bill was then proceeded with; and great exception was taken to clause 53, which provided that the Assessment Committee, in making out the next valuation list after the passing of the Act, should include and assess all unoccupied houses and buildings and vacant land, including land on which there were uncompleted buildings, and should cause the totals of the gross and rateable values of such houses, buildings, and lands to be ascertained and included in the valuation list; and such houses, buildings, and lands should thereupon become rateable. Mr. Morgan said this clause would commit them to the principle that unoccupied houses and land in the city should be liable to be rated as though they were occupied and bringing in rent. To-day there were 5000 or 6000 empty houses in Bradford. Where were the owners to obtain revenue from their property with which to pay rates? It was unfair to tax a man's property when it was bringing in nothing. Mr. Gledhill remarked that he would much prefer that the Corporation should come out into the open, and if they believed in the taxation of ground values say so; while Alderman Hartley said he wanted every tenant to remember that if these powers were obtained it meant lower rents. Thereafter some personalities were indulged in; and when ultimately it was decided to vote on the Bill as a whole, it was rejected.

At a meeting of the City Council next day, the Town Clerk (Mr. Frederick Stevens) reported that the Parliamentary Sub-Committee had that morning considered the course to be taken in regard to the Bills which the Corporation had sought to promote in Parliament; and they recommended that they should be withdrawn. A question was asked as to who authorized the "planting" of the Corporation workmen in the Chamber to pack the meeting; and the Lord Mayor replied that he could not say. It had, however, been a usual thing to do. On some occasions, it had been difficult to get a meeting; and men had been called in out of the streets. Only the customary precaution had been observed, he thought. A long debate ensued; but eventually the Parliamentary Committee's recommendation was carried—only eighteen members voting in favour of the taking of a poll of the ratepayers.

ILLUMINATING POWER OF SALFORD GAS.

The Town Council Approve of the Proposed Reduction.

Despite a good deal of opposition, the clause in the Salford Corporation Bill dealing with a reduction of the illuminating power of the gas from 17 to 14 candles was approved at a special meeting of the Council held last Wednesday.

Mr. Pinder, who led the opposition, said that the change would impose a great hardship upon many poor people, who would be put to the expense of purchasing incandescent fittings and mantles. He was told that the introduction of incandescent lighting into mills and works would be a serious matter, as the vibration must have a disastrous effect on the mantles. It could not be said that even the present illuminating power of the gas was satisfactory, either indoors or in the streets; and a reduction of the standard would, of course, make matters still worse.

In a lengthy reply in defence of the action of the Gas Committee, the Chairman (Alderman Phillips) said the matter was one of scientific fact and knowledge. By the use of the incandescent mantle, 14-candle gas gave a light quite as good as 18-candle gas in the old burner. It had been clearly demonstrated, also, that it was cheaper. He explained, in reference to what had been said about cost, that the whole equipment for converting an ordinary jet to the incandescent method could be obtained for 9d., and that this expenditure would be saved on the first 1000 cubic feet of gas consumed. Then it should be remembered that the cost of producing the gas would be less. Alderman Phillips argued that, for the sake of the poor people themselves, it was quite time their attention was drawn to the better system of lighting by means of the incandescent burner. He also pointed out that in the last eight years 50 per cent. of the gas undertakings in the country had obtained powers to fix their standard at 14 candles. In fact, in some cases, it was only 13 candles.

The clause was, on a division, approved by a large majority.

In deference to the strong objection taken to another clause providing for the closing of West Egerton Street, so that contemplated extensions at the gas-works could be carried out, Alderman Phillips, on behalf of the Gas Committee, agreed to its deletion from the Bill. At the same time, he expressed regret that this particular clause had on two previous occasions been approved by the Council without any very strong representation of opposition to the proposal. The acquisition of the street would have been of great advantage to the gas undertaking; but as it was felt that serious public inconvenience would be caused by the closing of the thoroughfare, he took the responsibility of withdrawing the clause.

The Bill came before a meeting of ratepayers on Friday evening at the Salford Town Hall. Considerable opposition was offered to the clause authorizing the Corporation to reduce the illuminating power of the gas, the adoption of which had been moved by Alderman Phillips. He said though the proposal might appear to be a retrograde movement, it was not really so. He once again pointed out the advantages to be derived by gas consumers using the incandescent system, showing that the cost of a mantle and fittings would be from 6½d., and adding that on the first 1000 cubic feet of gas burnt the consumer would save this amount and more. On the clause being put and declared carried by the Chairman, Mr. Williamson (a member of the Council) demanded a poll of the inhabitants upon the question. All the other clauses, including one for an extension of the gas-works, were agreed to.

Possible Opposition by a District Council.

The Worsley District Council have appointed a Committee to take such action as may be deemed necessary in opposing the clauses of the Bill which will give the Salford Corporation power to reduce the gas from 17 to 14 candles. This action has been taken presumably because the Corporation will not consent to the suggested limitation of profits made by the Gas Department, or give any guarantee as to a reduction in the price of gas supplied to consumers.

DEVONPORT GAS UNDERTAKING.

Limits of Municipal Trading.

On the presentation of the minutes of the Gas Committee at the meeting of the Devonport Town Council last Thursday, Mr. Daymond called attention to the report of the Gas Engineer, that the output of gas during the month was 0·22 per cent. less than in the previous month, and asked whether this decrease was in any way connected with the fact that people who wanted slot meters were unable to obtain them. He believed this was the first time a decrease in the consumption had been reported since the Corporation acquired the works.

Mr. COOMBES said the Committee recorded an expression of opinion by the Gas Engineer that the department should undertake all the gas-fitting work required by customers. The Engineer had a right to his opinion; but he hoped the Gas Committee were not of the same opinion, because they might do an injustice to tradesmen in the town. He did not believe in municipal work at all except when they were forced to do it. It was unfair to those who paid the rates.

Alderman LITTLETON agreed with Mr. Coombes in part, but said there were exceptions. The Electricity Committee made a bargain with the tradesmen of the town that they would not supply anything in the way of fittings at less price than the tradesmen. The result of this was that the Education Committee had to go outside the town for fittings, and they had that week instructed the heads of the department to go elsewhere to buy fittings at 22 per cent. less than they could purchase from tradesmen in the town or from the electricity undertaking. If they were going into municipal trading on the condition that they would not supply anything at less cost than tradesmen, it was injurious to them as a Council.

Mr. BISHOP said the Gas Committee had been opposed to the principle expressed by the Gas Engineer; and he did not see why they should endorse it now. If they were going to let the Corporation do everything, how would their sons get a living?

The TOWN CLERK pointed out that this was only the Engineer's report, and an expression of his opinion, and that the Committee had not endorsed it or given any instructions with regard to it.

Mr. DAYMOND thought this ought to have been considered before they acquired the undertaking. If they were going to make all sorts of restrictions and limitations, they would be crippling the business. As they had bought the gas-works, they should allow the Gas Engineer to compete with private traders, if he could do so in a just and legitimate manner. The opinion expressed by their Engineer was in the interest of the general body of ratepayers.

Alderman WAYCOTT hoped the Committee would not be influenced by the opinion of the Engineer. He respected the Engineer's zeal, but did not believe in interfering with private traders.

Alderman GOODMAN trusted that the Gas Engineer would not be daunted by anything said there that morning, but would do everything that was possible in the interest of the undertaking. They were not there to represent the gas-fitters of the town, but the ratepayers in general; and he wanted the Gas Engineer to keep his energy and his brain power centred on the undertaking. He hoped the Chairman of the Committee would not promise that this suggestion should not be acted upon.

Alderman TOZER, the Chairman of the Committee, said that, whatever the cause of the decreased consumption, this was not the time to discuss it. As to the supply of gas-fittings, the minute was merely an expression of the Engineer's own opinion, and the Committee had not endorsed it.

There were a number of complaints as to the indifferent lighting in the town, and promises were made that they should receive attention. Mr. Mayne said that in parts of the town shops had been converted into private houses, and the effect was that the lighting of the streets was nothing like what it used to be.

A London Gas Suicide.—Letters found in a Mrs. Sims's room after her death, and written by her, stated that she was so ill that she could not endure it any longer. She was a widow, 66 years of age, living at Kentish Town; and was discovered dead with a rubber tube leading from a gas-pipe in her mouth. The Coroner's Jury returned a verdict of "Suicide during temporary insanity."

Automatic Lamp Lighting at Southampton.—At the meeting of the Southampton Town Council on Wednesday, the Lighting Sub-Committee reported that they had inspected the automatic lighting of the public gas-lamps fitted with the Elton-Stephens apparatus; and they expressed their complete satisfaction with the manner in which it was found to be working. No failure had taken place in the whole of the lamps furnished with it.

OPPOSITION TO THE WEST HAM GAS AMALGAMATION.

At the Meeting of the West Ham Town Council last Tuesday, Mr. Hurry moved, as a matter of urgency, that the question of the best steps to be taken to oppose the amalgamation of the Gaslight and Coke and West Ham Gas Companies be referred to the Legal and General Committee, in order that they might advise the Council thereon, in order that the interests of West Ham could be safeguarded. He said the proposed amalgamation was alarming, from the point of view alike of the burgesses, the workers, the consumers, the general public, and the shareholders; and he hoped the Committee would consider the matter from all these standpoints. If the amalgamation took place, there was a possibility that within a few years between 500 and 600 men would be thrown out of employment; and the loss in wages would be between £50,000 and £60,000 per annum. At the present time, the consumers under the West Ham Gas Company were paying 2s. 8d. per 1000 cubic feet for their gas; under the Gaslight and Coke Company they were paying 2s. 10d. A reduction of 1d. had been promised; but on the south side of London the Company were only charging 2s. 5d. Therefore, from the aspect of the consumers, the Council had something to fight for; and it was their duty to oppose the Bill tooth and nail. Then let them look at the matter from the point of view of the maximum price. In West Ham, it was 2s. 11d.; but under the Gaslight and Coke Company, it was 3s. 3d. They had also to consider the question from the monopoly aspect, and when a large undertaking of this description was a monopoly, the consumers and the general public would have to suffer. Mr. W. Thorne expressed surprise that Mr. Hurry had agreed to alter the terms of his resolution, which, as it stood on the *agenda*, was in favour of the Town Council seeking powers to obtain the gas-works themselves. He knew that in the matter of acquiring the works the Council had a difficulty, owing to the fact that gas was supplied to other districts; but he thought they could get over this by assuring the other Municipalities that they should be treated as well as they were at the present time. No matter what the Manager of the Gaslight and Coke Company might say, he (Mr. Thorne) was firmly convinced that the West Ham Gas-Works would be closed. Mr. Cohen said he was glad Mr. Hurry had reconsidered the matter; for the resolution he had now submitted would receive more careful consideration than any "wild cat" scheme. The position he took up was that, so long as the interests of the borough of West Ham were safeguarded, this was all they had to consider. The Gas Company could not increase their dividends unless they lowered the price of gas to the public, and therefore it was to their own interest to reduce it. Mr. Gardner expressed the opinion that by nothing short of municipal ownership could the interests of the workers be safeguarded. Mr. Hurry's motion was then put and carried *nem. con.*

THE PUBLIC LIGHTING OF CALCUTTA.

In the last number of the "JOURNAL," reference was made to the above subject, in connection with an invitation which had been received by Mr. J. G. Newbigging, the Gas Engineer to the Manchester Corporation, to proceed to Calcutta "to advise the Municipal Council on the new scheme now under consideration for the lighting of the streets of the city." At the close of the article, it was stated that the Oriental Gas Company, in whose hands, as our readers may remember, is the gas supply of Calcutta, were understood to have submitted a scheme for the better and more effective lighting of the streets, and that the members of the governing body were "desirous of obtaining expert advice before coming to a decision whether to adopt gas or electricity as the illuminating agent, or both." With reference to the last statement, we learn that the Directors of the Oriental Gas Company, in response to invitations in the Press, some time ago submitted tenders for the public lighting; and their scheme was favourably regarded, as will be seen from the following extract from the report, dated July 17 last, of the Chairman of the Calcutta Corporation (Mr. C. G. H. Allen), on the municipal administration for the year 1907-8.

Some improvement has been made in the public lighting by the erection of powerful lamps at street corners, as well as by the substitution of gas for oil lamps, the number of the former having now risen to 9500; but it has long been felt that the standard of street lighting is not up to modern requirements. The existing contract with the Oriental Gas Company, which provides for lamps of but 24-candle power, will not expire till 1911; and, under ordinary circumstances, the city must have waited another three years before obtaining any improvement. But it has fortunately been possible, owing to the turn which events have taken, to forestall this date; and the new arrangements, which provide for lamps of 2½ times the brilliancy, without any increase in cost, will probably come into effect at once.

As mentioned in last year's report, advertisements were issued in Indian and European newspapers in May, 1907, inviting tenders for schemes for the lighting of the city; ample time being thus afforded to any competitor of the Gas Company to instal the necessary plant before the expiry of the existing contract three years hence. Tenders were received in December, 1907; two of these being for electric lighting, while the third was submitted by the Oriental Gas Company, who offered to forego the remaining three years of their existing contract, and introduce improved lighting at once, if their offer was accepted. Upon a careful consideration of all these tenders, the Corporation decided by a large majority in favour of the Gas Company's offer; the Commissioners holding that, of the two offers which were pressed (for the third offer was dependent upon the Corporation consenting to incinerate all the street refuse—a change which the Commissioners were not prepared to adopt), that of the Gas Company possessed superior advantages, as the cost was somewhat lower, while the lamps offered were decidedly better adapted for street lighting.

The Commissioners, having thus been at pains to invite offers the world over for this important contract, decided in favour of the offer of the Gas Company upon its merits, after due consideration of the rival tender for electric lighting. No sooner had this decision been arrived at, however, than the legality of the proceedings was called in question, upon the ground that the advertisement calling for tenders, as well as the tenders themselves, should have been first submitted to the General Committee, before being considered by the Corporation. This opinion having been supported by that of Counsel, it was necessary to retrace the steps which had been taken; and the resolution to accept the Gas Company's tender having been formally rescinded, the Corporation decided, in view of the experience which had been gained after inviting offers in the open market, to adopt gas as the street illuminant. The General Committee have since issued a formal advertisement calling for tenders for gas lighting the streets; and the Oriental Gas Company have repeated their former offer. These terms, which appear to be very favourable to the city, have been recommended to the Corporation for acceptance.

The history of these proceedings has been narrated at length, although part of it properly belongs to the current year rather than to the period under report, because this is a matter which has aroused much public interest, and it is desirable that a connected statement of what has occurred should be placed upon record. As a result, there is every reason to believe that the city will gain a much improved standard of lighting without additional cost; and the improvement will take effect at once, so that the ratepayers will derive this benefit immediately, instead of having to wait three years for it.

The Invitation to Mr. J. G. Newbigging.

With reference to the above matter, Alderman Gibson, the Chairman of the Gas Committee of the Manchester Corporation, has felt compelled to advise his colleagues against the granting of two months' leave of absence to Mr. J. G. Newbigging to enable him to accept the invitation received from the Calcutta Corporation. The Committee appreciate the honour done to their Chief Engineer, but feel it would be unwise for him to be absent from duty for so long a period, especially in view of the important work now in hand, which requires his constant personal supervision. In conversation with our Manchester correspondent, Mr. Newbigging said he fully understood the reason which had led Alderman Gibson to suggest to the Committee the inadvisability of acceding to the proposed leave of absence, which might possibly extend to more than the two months.

PUBLIC LIGHTING OF IPSWICH.

At a Special Meeting of the Ipswich Town Council last month, it was stated that the Gas Company were prepared to renew their contract to light the whole of the public lamps in the borough, for a period of three years or more, at a reduction of 3s. per lamp per annum off the price now charged for the lamps fitted with Welsbach "C" burners, and 5s. for those fitted with No. 7 Kern burners. It was pointed out that the effect of this reduction would be a saving to the Corporation of about £260 a year. The Lighting Committee endeavoured unsuccessfully to induce the Company to offer the same terms for a contract of one year, as they had had suggestions from the Electricity Committee for lighting the borough; and they then asked the Council to empower them to make what arrangements they could with the Gas Company for a contract extending over not more than two years from the 31st ult.

At a Special Meeting of the Council last week, Mr. H. W. Raffe, the Chairman of the Lighting Committee, said he would like to inform the members that the Gas Company had agreed to a two years' contract at the full reduction, and had offered to give the Council a free hand to deal with electric light up to the number of fifty lamps. He thought this was very satisfactory indeed. (Applause.) The number of electric lamps named was as many as they wanted for experimental purposes.

SUDBURY TOWN COUNCIL AND THE GAS-WORKS.

Purchase Declared to be Impossible.

At the Quarterly Meeting of the Sudbury Town Council, some discussion took place with regard to the desirability, or practicability, of acquiring the local gas undertaking, in connection with a motion by Mr. Alston—"That, as the present lease of the Sudbury Gas-Works expires at the end of June next, it is now an opportune time for the Corporation to consider the advisability, or otherwise, of purchasing the concern; and that the Mayor be requested to call a meeting of the General Purposes Committee at a very early date to consider the matter." He said it was only an abstract resolution, and did not pledge the Council to anything except the consideration of the matter. He hoped that if the thing went through it would be a very great help to the ratepayers. He had spoken to several influential people on the subject, and found that most of them were agreeable to the Council taking over the works.

The Town Clerk said he had gone into the matter, and had investigated the cost of taking over gas undertakings. He found that the average price which had been paid was £1500 per million cubic feet of gas produced. He understood that at Sudbury they manufactured something like 21 million cubic feet per annum; and supposing they bought the undertaking at £1500 per million, it would cost the Council about £31,500. The limit of their borrowing powers was £44,000—double the amount of the annual assessable value. They were already owing something like £30,000. As a matter of fact, it was £40,000; but £10,000 of this did not come into the account. They therefore could not carry the scheme through, as it exceeded their borrowing limit.

Mr. Alston remarked that this showed what an utter muddle they had been got into by their predecessors. They were unable to negotiate for the gas-works, because they had borrowed money right up to the hilt for things which would not bring them in anything. Here they had something to negotiate for which would bring in money; but they were helpless.

Alderman Baker said that he had made inquiries months ago as to

their position in the matter; and when he found that it was absolutely impossible to take over the works, he had abstained from bringing the matter before the Council. Mr. Bacon told the members he found that on one of their loans they had paid £16,000 in interest; and they had not repaid one penny of the £10,000 principal.

Mr. Alston again said he thought the resolution should be discussed by the General Purposes Committee; but on a vote being taken, it was lost—four voting for, and five against.

MAIDSTONE ELECTRICITY FINANCES.

Action by the Local Government Board.

The Maidstone Electricity Committee have been sharply called to account by the Local Government Board, whose action in the matter of a desired loan has considerably agitated the Town Council.

At a meeting last week, the Electricity Committee reported that they had received the following letter from Mr. J. S. Davy, Assistant-Secretary of the Local Government Board, addressed to the Town Clerk of Maidstone, with reference to the Council's application for sanction to borrow £20,770; and they recommended that the undertaking referred to therein be given, and the statement asked for furnished to the Board.

Sir,—I am directed by the Local Government Board to state that they have had under consideration the report made by their Inspector, Mr. Hooper, after the inquiry held by him with reference to the application of the Town Council of Maidstone for sanction to borrow £18,440, since increased to £20,770, for purposes of their electricity undertaking.

The Board learn from their Inspector's report that there has been an excess expenditure amounting to £5559 on works, &c., in respect of which sanctions to loans have previously been granted, including an excess of about £3160 on account of the works for which the original loan of £38,048 was sanctioned in November, 1900. It appears that the excess expenditure on this loan has been met out of the moneys borrowed under subsequent sanctions to loans for other purposes of the undertaking, and that, in fact, all the loans have been placed to a common fund and used for the various purposes of the undertaking, and no proper accounts have been kept of the expenditure under each loan. The result is that the Town Council are not now in a position to show precisely in respect of what particular items the excess expenditure has been incurred.

The Board further learn that the Town Council have within the last two years incurred expenditure on new works and machinery, &c., amounting to £9760 19s. 1d., in anticipation of sanction to a loan, notwithstanding the warning given in the Board's letter of May 22, 1905. It also appears that the Town Council have purchased motors to be let out on hire, and have undertaken the wiring of private houses, without any statutory powers for these purposes; and that the money to meet this expenditure has been obtained by means of an overdraft on the Borough Treasurer.

The proceedings of the Town Council in these matters have been very unsatisfactory; and, before sanctioning any further loan for the purposes of the undertaking, the Board must ask the Town Council to give an assurance that similar irregularities will be avoided in future, and that proper and separate accounts of the expenditure under each loan will be kept. The Board must also request the Town Council to submit proposals for paying off the overdraft on account of the illegal expenditure on motors and free wiring within a shorter period than seven years. At the same time the Board should be furnished with a statement allocating the sum of £3454 11s. 11d., included for new works in capital expenditure to March 31 last, to the various purposes indicated in the Corporation's abstract of accounts for 1907-8.

In moving the adoption of the report, Alderman Vaughan, the Chairman of the Committee, said he was pleased to find that the Local Government Board were insisting on a scheme of keeping accounts which would obviate the present unbusinesslike method. The Electricity Committee would strictly adhere to the instructions contained in the letter. The mention in the Board's letter of the warning the Council had previously had, caused Alderman Vaughan to say that the warning was feeble in the extreme. The Council decided on April 3, 1907, to ask for the loan; and the work being urgent, of course it had to go on. They could not wait for the inquiry, which did not end for nearly two years. With reference to the purchase of motors, that was not strictly in order; but it provided for a want, and had been a great benefit, especially to the tradespeople of Maidstone, who had been enabled to hire motors at a reasonable rate. Further than this, it had been a profitable undertaking, so far as the Council were concerned. He thought the Council knew what they were doing in this respect. Speaking of the request as to how the illegal expenditure was to be cleared, he said he had been informed that the amounts in question would be extinguished entirely in three or four years. He did not know that there was anything further in the letter to comment upon; but he would like to point out that they could not possibly stand still in carrying on the work. The increase in business had been so great that the additional expenditure had been absolutely necessary.

In the course of the discussion which took place on the motion for the adoption of the Committee's report, the Mayor (Mr. J. Potter) remarked that they ought to move a vote of thanks to the Local Government Board for their determination to change the system of account keeping which existed at present.

Alderman Laurence said he would like to draw attention to the fact that the Local Government Board's letter was dated Nov. 30; and it should therefore have been before the Council before. It was not produced before the Finance Committee; and therefore all the remarks he had to make must be made that morning and in public. The Local Government Board had not referred to by far the most serious thing of the whole affair. They might fight against red tape, and do no damage; but if they misled either the public or the Council, they undoubtedly did something which was wrong and very far-reaching in its consequences. The result of the improper work of the Electricity Committee had been to issue false balance-sheets, which purported to show a profit when that profit had not existed. During the past year, when there was an overdraft varying from £12,000 to £14,000, the only interest on the overdraft that was charged against the profits of the undertaking was a sum of £51 6s. It was obvious that the electricity accounts should have been charged at the full interest at least on the money they were using. But he wanted to go further than that. They might say that the money was obtained by the balances which the other Committees possessed. Then, in that case, the interest should also have been charged. But it was still more serious. The Drainage Committee having done their business in the proper way, and secured sanction for their loans before they spent the money, the Electricity Committee took advantage of the money, paying no interest, and thus showing a profit on their accounts. It was a false balance-sheet.

Replying to the discussion, Alderman Vaughan said the Electricity Committee had nothing to do with the making up of the accounts. That duty belonged to the Finance Committee; and why should not they come in for their share of the blame? The Electricity Committee had done nothing wrong; and the Local Government Board's letter was not a censure upon them. It merely meant that the system would have to be altered in the future; and having a strong man at the head of the Local Government Board, the system all over the country would have to be altered. Like other councils, they would have to knuckle under, and do what they were told would have to be done. With reference to the charge of falsifying accounts, he was quite prepared to have the amounts of interest put down every year; and that he thought was the proper thing to do. There would still be a good profit in the undertaking.

The report was then adopted.

THE MERITS AND DEMERITS OF ELECTRIC LIGHTING.

At the last Meeting of the Manchester Association of Engineers, a paper on "Metallic Filament Lamps," read by Mr. W. A. Barnes, of Horwich, gave rise to a discussion which brought out some points that were favourable to gas.

In the course of his paper, Mr. Barnes, having dealt with what he described as the "phenomenal progress" electric lighting had made in the last five years, went on to say that when the old carbon lamps were replaced by metallic filament lamps the consumption of current decreased, resulting for the time being in a smaller output from the central stations. This, however, had been more than compensated for by the steady augmentation in the number of users; the reduction in the cost of metallic filament lamps inducing many people who were dissatisfied with the old carbon lamps on the ground of expense, to become strong advocates of electric lighting. A disadvantage of metallic lamps was, however, that they were best at low voltages or high candle powers, which sometimes prohibited their use in small rooms. In the attempts to remedy this, some success had been attained with the tantalum lamp.

In the discussion, it was Mr. J. R. Bellington who came forward to defend gas as an illuminant. Having pointed out that in recent years very great improvements had been effected in gas lighting, he said that one of the pet arguments of electricians was that the use of gas was responsible for the air being vitiated; but it was interesting to know that incandescent lights only did this to the extent of one-sixth as compared with old flat-flame burners. Another point to remember was the effect of the electric light on the eye. It was true that while lighting appliances had greatly improved, the methods of using them were generally very crude and sadly at fault. The lamps were too often fixed so near the place requiring light that they were in the line of vision, and caused distress and injury to the eye. On the other hand, the incandescent gas-burner gave such an abundance of light at small cost that it could be placed farther away; thus furnishing a more suitable illuminant. The Chairman of the Association (Mr. Hughes, of Horwich) maintained that, unless the cost of electrical illumination was considerably reduced, the incandescent gas-burner would not be displaced. He added that railway companies had sunk hundreds of thousands of pounds of capital in plant for the manufacture of gas, and would not readily change. In reply, Mr. Barnes admitted that the metallic filament lamp was as yet in a state of transition, but said that within the last year great improvements had been effected, tending to make it stronger and better adapted to withstand vibration. As to the effect of the electric light on the eye, he agreed that the brightness of the filament lamp was certainly a disadvantage, but submitted that this could be remedied by placing the lamp out of the range of vision, or by the use of suitable shades.

Gas Pressure and Gas Bills in Birmingham.—Letters have recently appeared in the "Birmingham Post" from correspondents complaining that, while they have been burning gas for fewer hours than formerly, their gas bills are heavier. Surprise has been expressed at this apparent inconsistency; and in an endeavour to seek an explanation, one correspondent seemed to suggest that the increased consumption according to the meter figures was due to augmented pressure. Mr. G. Hampton Barber, the Secretary of the City Gas Department, has, however, assured a representative of the "Birmingham Daily Mail" that pressure has nothing to do with the matter. "Why," he said, "if, as it seems to be suggested by the correspondents, the pressure was being increased in order to force more gas through the meters, we should blow the water out of the meters, and so place the town in darkness. Especially would this be the case in regard to the four-light and five-light meters, which form not far short of 90 per cent. of the meters in use." Moreover, Mr. Barber added, the volume of gas unaccounted for would be largely increased, with a corresponding loss to the Gas Department. In private houses, domestic servants not infrequently are so careless in the use of gas as to cause great waste; and the Gas Department suggest that it is possible some similar wastage takes place on business premises where thoughtless workpeople burn the gas in unnecessarily large quantities.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Eastern Scottish Juniors well nigh had their meeting in Dundee this afternoon spoiled by inclement weather; but such is the enthusiasm of the members in the northern section, that they struggled through the snowstorm, some coming from as far as Aberdeen, and the attendance was in all respects gratifying. So was the material provided in the *agenda*. Mr. Alex. Yuill, of Dundee, gave an address which, for straight talking and plain dealing, it would be difficult to surpass, and it was couched in a tone that was most appropriate before a meeting of Juniors. The paper by Mr. A. R. Wilson, of Perth, on "Economies in Gas-Works," was a well-reasoned contribution. It traversed a good deal of the ground which Mr. Yuill had gone over; and the two communications together contained sufficient fact and opinion to incite to discussion. Expectation in this matter was not disappointed, as there was a very full and frank discussion. This, the second quarterly meeting of the Association held outside of Edinburgh, thus proved, though it took place under trying conditions, a great success. The attendance was entirely drawn from the district north of the Forth; the weather, presumably, having prevented the whole of the members in the southern section making the journey to Dundee.

In the Glasgow Town Council on Thursday, the Watching and Lighting Committee recommended that a practical test be made of the "Horstmann" system for the automatic control of the lighting and extinguishing of street gas-lamps. Bailie Hunter, in moving the recommendation, said that the apparatus approved by the Committee would entail an initial cost of about £480 to fit up 290 lamps. At present, each lamplighter received £67 12s. per annum for looking after 118 lamps. If under the new system he could look after double the number, a considerable saving would be effected. Mr. Cash moved that nothing be done in the matter, as adoption of the automatic controller would mean the displacement of a considerable number of men. Mr. Alston was not against their having the most approved method of lighting, but was of opinion that the present was not an opportune time for introducing it. Treasurer Graham was surprised at the opposition to the proposal. It reminded him of the days when machinery was introduced, and when the men who were displaced by it went about smashing it. The effect of the new apparatus would be to save no less than £5000 in gas alone, in addition to the saving in men's wages. In Liverpool, the system had resulted in a saving of 50 per cent. upon wages, and of not less than £3000 on gas. Only the mover and his seconder supported the amendment. The recommendation was therefore adopted.

Among other matters before the Wishaw Town Council on Monday was a report of a special meeting of the Gas Committee, which had been called for the purpose of considering the advisability of granting the Gas Manager a holiday, The Committee, by a majority, recommended that the Manager be granted leave of absence for three months. In the Council, Mr. Loudon said the proposal was not made out of any personal feeling towards the Manager; it was one of policy and the economical management of the gas-works. When he was appointed Convener, he was informed by the Manager that, in order to obtain better results, he would require both larger condensing apparatus and larger scrubbing plant. To have entered on this would have entailed more capital expenditure, and therefore increased cost of gas; and to this he could not agree. Their policy was to save money and to keep down expenditure. He had gone into the matter for himself, and had come to the conclusion that the present plant, if properly handled, was quite sufficient to produce what was at present required. The Manager, however, told him that he could not do any better with the plant at his disposal. If this were the position he took up, then the only other course to follow was for the Manager to take a holiday, and a demonstration could then be made of what the plant was really capable of doing. Before 1894, there had been expended on the gas-works a sum of £33,250; the amount now stood at £46,012. The gas made during this period had risen from 56 million cubic feet to 69 millions. Wages had risen from £1567 to £2134; but of this increase the Council were responsible for £100 which was added to the workmen's wages. Their expenditure on cookers was not paying. In view of these facts, he was not favourable to further expenditure on new plant until the present had been thoroughly tested. The Manager's estimate of income and expenditure for the present year showed only an apparent balance of £651, based on the price of gas at 2s. 11d., without any notice being taken of the deficit on the electricity account, amounting at least to £888. When they agreed to the rise of 5d. per 1000 cubic feet in the price of gas, it was in the belief that they would work out with a reasonable surplus. The present position of matters was not, in his opinion, satisfactory; it was not fair to the ratepayers. They had had a hard struggle to make ends meet, and they were not prepared to face additional responsibility without at least making the trial suggested. Mr. Steel, in seconding, said that if Mr. Watson were right, he would come back with flying colours; if he were wrong, then, so far as he was concerned, there would be no more use for Mr. Watson. Bailie Bell moved disapproval of the minute. Was it reasonable, he asked, to give the Manager the holiday proposed, and leave the works to the tender mercies of the Convener? What the Convener wanted the Council to do was really to dismiss a capable servant. The Manager's reports, when he came to the works, showed that they were not then in a satisfactory condition. He asked them, by their vote, to express their confidence in the Manager. Mr. Scott, in seconding, said he thought it would be a retrograde step to leave the works for the length of time proposed without a Manager. Mr. Watson's duty was to produce gas, and he was not responsible for the state of the revenue. They ought to keep in mind how much was now being charged to revenue which formerly was charged to capital. Bailie M'Namee said he anticipated such a motion as this a long time ago. It was unfair to mix up the electricity deficit with the finances of the gas-works in the way that had been done by the Convener. The plant was undoubtedly being worked beyond its normal capacity. By the terms of his appointment, it was the duty of the Manager to instruct the Committee as to how gas was to be made. Did they expect that the Committee were now to be able to instruct the Manager? Mr. Frew suggested, as the best way to do justice to all parties, the calling in of an expert to give his opinion on the whole matter. Bailie Gibson thought that if the Manager had done his best with the plant, and it had proved insufficient, they ought to back him up and get the new plant necessary. Bailie Nimmo thought the Manager had been unjustly and ungenerously treated. Provost Thomson concurred in the motion, simply because he desired to recognize the wishes of the Convener. His own view was that, under the present circumstances of their gas-works, the Manager ought to be dismissed. Before the Manager came, the works paid their way; now they were getting worse and worse. Seven members of the Council voted for disapproval of the minute, and five for approval. Thereupon the Convener and two others resigned membership of the Committee, and their places were filled up. There is an uncomfortable feeling about this business. It almost looks as if the hostility to Mr. Watson has risen out of the fact that the gas undertaking cannot be made to pay its way with gas at a cheap rate, and also bear the burden of the electric light undertaking. But, whatever the merits of the subject, was ever a more absurd proposal made than that a Gas Manager should go away for three months, and allow the Convener to manage? Even though he were a fully qualified man, he could not, in three months, rehabilitate a sick undertaking, assuming the one at Wishaw to be so.

In the Lerwick Town Council last week, it was reported that a meeting of the Committee upon the taking over of the gas-works was held on Dec. 10, and that after considering the question of the introduction of the De Laitte gas system, it was agreed to recommend the Council to make a practical test of the light by getting an installation for the Town Hall Buildings. Mr. Ratter said they were told that the light would cost 1s. 6d. per 1000 cubic feet. They were at present paying 6s. 3d. per 1000 cubic feet, and he asked if they were going to lie down to the Gas Company. Now, in this matter the Council had better be kept right. The 1s. 6d. mentioned is the cost of the petrol; and it is not so cheap as the cost of coal in the production of coal gas. Distribution and establishment charges would have to be reckoned with by the Council if they were to adopt a petrol-gas system. A very heavy charge which the Council would have to face, should they pass by the Gas Company, would be the laying of a new distributory system in the town from the works to the burners. To do this they would require statutory powers; and the 1s. 6d. per 1000 cubic feet would be left behind a long way before they could begin to sell gas. This points to their first duty being to come to terms with the Gas Company if they wish to have the gas supply in their hands, and then to consider whether they should supply coal gas or petrol gas. At most, their present policy of fighting a vested interest can only go in the direction of depreciating the Gas Company's property, after which, of course, better terms might be made with the Company. But to effect this depreciation customers would require to be abstracted from the Gas Company; and this process—the Council not possessing distributing mains—could only be effected by the setting up of private installations of petrol gas in the larger establishments in the town. If this were once accomplished, what would be the prospect of the owners of those private installations, should the Council succeed in getting the Gas Company's undertaking cheap, giving up their plant and taking their gas from the Council? To do so would result in the owners losing upon their plant, and being responsible for their share of the distribution and establishment charges which the Council would find it necessary to make—charges which they would avoid in retaining their private installations. These considerations reduce the policy of fighting a vested interest to either a blindfold or a spiteful policy. Whichever it is, it is not an amicable policy; neither is it one which would serve the best interests of the community.

I am informed that gas has begun to be made in the gas-works at Kennoway, in Fifeshire. These are entirely new works, erected in a place where there has hitherto been no gas supply. Mr. J. Scott has been appointed Manager of the undertaking. Within the past few years new gas undertakings have come into existence at Kelty, Kennoway, and Largo. Another is expected shortly to be added to the list. A Company is being formed for the supply of gas to the villages of Bowhill and Cardendon, in the vicinity of Kelty, the prospectus of which will, in all probability, be issued soon.

A scheme which I have often wondered has not been taken up seems in a fair way to be so now. That is the extension of the gas-works in Inverkeithing. The prospect of returning prosperity to the town, in view of its proximity to Rosyth, does not seem to have impressed the Directors of the Gas Company; but others have seen the possibility, if not the necessity, of something being done to extend the gas supply. The Town Council are to be moved in the matter. Provost Niven has given notice of a motion upon the desirability of the Council acquiring the undertaking of the Company.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Jan.* 16.

Sulphate of Ammonia.

Buying has again been mainly for the purpose of covering January contracts, direct buyers being unwilling to follow the advance; but, notwithstanding this, buying has been sufficient to bring about a further improvement in values, and the closing quotations are £11 12s. 6d. to £11 15s. per ton f.o.b. Hull, £11 15s. to £11 16s. 3d. per ton f.o.b. Liverpool, and £11 17s. 6d. per ton f.o.b. Leith. There continues to be inquiry (mainly speculative) for the forward position; but the firmness of makers, who now quote £12 per ton f.o.b. good ports, has hindered further business.

Nitrate of Soda.

This article remains quiet on spot at 9s. 6d. and 9s. 7½d. per cwt. for 95 per cent. and refined qualities respectively.

LONDON, *Jan.* 18.

Tar Products.

There has been little alteration in the prices of tar products during the past week. Pitch remains easy, and business has been done for January delivery on the east coast at 18s. to 18s. 6d. London manufacturers are evidently not inclined to sell at present; but it is doubtful whether anything over 18s. 6d. can be obtained for London make. On

the west coast, business has been done in South Wales at 22s. 6d. to the end of September next. On the Continent, business is very quiet indeed, and the majority of the manufacturers appear to be well covered for their present requirements. Creosote is steady. The principal London manufacturers are asking 3d. to 3⅛d. for forward delivery; but for prompt delivery, it is still possible to buy at 2⅞d., or even a little under this figure. In the Midlands, 2⅞d. is asked; while in the North, 2⅝d. to 2¾d. is quoted. Benzol is very weak indeed, and business has been done in the North at 5⅛d. to 5¼d., casks included f.o.b., for delivery to the end of June. Benzol, 50-90 per cent., is quiet, and toluol is rather easier. Solvent naphtha remains steady. There is not very much business doing in this article; and it is impossible to obtain orders on the Continent for English makes, as the Germans are underselling considerably. Carbolic is quiet, and 75's have been sold in London at 1s. 3d., and 60's on the east coast at 1s. Crystals are without interest. Naphthalene is quiet; and creosote salts are in fair demand.

The average values during the week were: Tar, 10s. 9d. to 14s. 9d., *ex* works. Pitch, London, 18s. 6d.; east coast, 18s. to 18s. 3d.; west coast, 17s. 3d. to 18s. 3d. f.a.s. Mersey, 17s. 6d. to 17s. 9d. f.o.b. other ports. Benzol, 90 per cent., casks included, London, 6d. to 6¼d.; North, 5¼d. to 5⅜d.; 50-90 per cent., casks included, London, 7d. to 7¼d.; North, 6⅜d. to 7d. Toluol, casks included, London, 9d. to 9¼d.; North, 8½d. to 9d. Crude naphtha, in bulk, London, 3½d. to 4d.; North, 3⅜d. to 3¾d.; solvent naphtha, casks included, London, 11d. to 11¼d.; North, 10d. to 10½d.; heavy naphtha, casks included, London, 11d. to 11¼d.; North, 10d. to 10½d. Creosote, in bulk, London, 2⅝d. to 2¾d.; North, 2⅝d. to 2¾d. Heavy oils, in bulk, 3d. Carbolic acid, 60 per cent., casks included, east coast, 1s.; west coast, 11⅜d. Naphthalene, £3 10s. to £6 10s.; salts, 32s. 6d. to 37s. 6d., packages included and f.o.b. Anthracene, "A" quality, 1½d. to 2d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article has been firm throughout the past week in London. The Gas Companies now quote £11 17s. 6d. for forward delivery; while for outside makes upon Beckton terms, £11 10s. to £11 12s. 6d. is realizable. In Hull, £11 15s. has been offered for one of the best makes; while the ordinary qualities have been sold at £11 12s. 6d. In Liverpool, £11 15s. has been paid. In Leith, this price has been declined, makers asking £11 17s. 6d.

A Todmorden Suicide.—After a heavy drinking bout, a Todmorden plate moulder named Thomas Smith, who was 55 years of age and lived alone, confided to a mate his intention not to go to work any more. Some days later he was missed, and on his house being broken open was discovered lying dead on a bed with his face covered and an india-rubber pipe in his mouth, the other end of which was attached to a turned-on gas-bracket. "Suicide while of unsound mind" was the Jury's verdict.

COAL TRADE REPORTS.

Northern Coal Trade.

With the colder weather, there is a fuller demand for some classes of fuel, and an occasional stiffening of prices. In the steam coal trade, some of the chief collieries appear to have sold their output for the whole of this month, and there has been fuller production in consequence. For best Northumbrian steams, the quotation is from about 10s. 4½d. to 10s. 6d. per ton f.o.b. For second-class coals, from 9s. 3d. to 9s. 9d. is quoted; steam smalls, from 4s. 6d. to 6s.; and, generally speaking, the collieries appear to be working well. In the gas coal trade, the demand is strong, and is much above that corresponding. Durham gas coals vary in price from about 9s. to 10s. 1½d. per ton f.o.b., according to quality, for the usual classes; while for "Wear specials," about 10s. 6d. to 10s. 9d. per ton is quoted. A sale of some 12,000 tons of gas coals is reported for Genoa, at a price equal to about 9s. 10d. per ton f.o.b.; and another, for a French contract for a long period, is at a price which is expected to leave 10s. per ton f.o.b. for good Durham gas coals. Coke is generally steady; but gas coke is very plentiful, and the price is weaker. From 12s. to 13s. per ton f.o.b., according to quality, is being quoted for gas coke.

Scotch Coal Trade.

Work has now been resumed generally in the collieries, but a number of steel works were idle last week, which greatly restricted the demand. Otherwise the request is fair. The prices quoted are: Ell 10s. to 11s., splint 10s. 6d. to 10s. 9d., and steam 10s. to 10s. 3d. per ton f.o.b. Glasgow. The shipments for the week amounted to 131,932 tons—a decrease of 45,621 tons upon the previous week, and of 7941 tons upon the corresponding week of last year.

Gas Employees' Promptitude at a Fire.—An instance of the value of promptitude in giving an alarm of fire is recorded in a Hastings paper in connection with an outbreak which occurred, on the evening of the 4th inst., in some large premises in the town, doing damage to the extent of between £6000 and £7000. A fitter named Oak, in the service of the Hastings and St. Leonards Gas Company, noticed smoke coming from the back of the premises; and subsequent investigation convinced him that the place was on fire. He at once communicated with the police and with Mr. C. F. Botley, who arrived on the scene before the firemen, and gave orders for the gas to be cut off. An incident of the conflagration deserves to be recorded. When the fire in the main building had been subdued, flame, which was quite unaffected by the water poured upon it, continued to burn in the back one; and it was found to proceed from a 2-inch gas-main which had been broken by the falling roof. Oak entered the building and turned off the gas; and with the extinction of the flame all danger of the fire spreading was at an end.

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CATALOGUES, CALENDARS, &c.

Messrs. George K. Harrison Limited, of Stourbridge, forward a monthly wall calendar, which is embellished with several illustrations of their well-known fire-clay mines and works.

Messrs. John Spencer Limited, of the Globe Tube Works, Wednesbury, have forwarded a device which, if generally adopted, would ruin what is now an important branch of the stationery trade. It is a calendar in the form of a disc, so arranged that by a simple turning movement the days of the week are shown for any given month over a period of twenty years.

As a souvenir of the recent opening of their new London offices and show-rooms at No. 129, High Holborn, W.C., the Parkinson Stove Company, Limited, have had designed a very effective metal matchbox, to represent a gas-cooker. The model is really an excellent one; and its usefulness to smokers is enhanced by the fact that it stands in the centre of an ash-tray. On the back of the box is the address of the show-rooms (which were noticed in the "JOURNAL" for Dec. 8, p. 684); and this should remind the users to pay a visit, if they have not yet done so, and inspect the display which is to be seen there of the firm's manufactures in gas cooking and heating apparatus, and Maughan's water-heating specialities.

Messrs. Henry Pooley and Son, Limited, of Birmingham, forward a copy of a newly-issued illustrated catalogue of weighbridges, the cover of which bears a representation of the distinctive Pooley weighbridge platform, affording safe foothold all over for horses, and a smooth wheel-track for motor and other waggons. Machines for all purposes are enumerated; and there are explanations of the new patent quadrant indicator for rapid and infallible reading, the latest pattern of engine balancing tables, a weighbridge specially designed for India, the Pooley unique "No Loose Weight" steelyard, and the patent "Worm-Wheel" relieving apparatus. A feature of the catalogue are some illustrations at the beginning, showing the evolution of the weighbridge. The first of these—dated 1700—is a heavy steelyard used with chains for attaching to loaded carts—the only method of public weighing in use up to the invention of Wyatt's machine. Next there is a picture of the first compound lever weighbridge, invented by John Wyatt in 1744; and then come the Pooley weighbridges as first made in 1835, and as designed to-day.

By way of supplement to the reference to the Lux purifying material which was made in last week's "JOURNAL," it may be mentioned that, in addition to the English gas-works which are at present using it, several lots have been sold by Mr. Daniel Macfie, of No. 1, North Saint Andrew Street, Edinburgh (as Agent for Herr Friedrich Lux), to important gas-works in Scotland. It is gratifying to be able to add that Mr. Macfie has excellent reports as to the exceptional merit of this material.

Swinton and Mexborough Gas-Works Purchase.

At a ratepayers' meeting which was held a few days ago for the purpose of considering the Bill which is being promoted by the Joint Authorities of Mexborough and Swinton to secure the transfer to them of the local Gas Company's undertaking, the Clerk to the Mexborough Urban District Council (Mr. J. W. Hattersley) explained the position of affairs. He referred to the inception of the Gas Company in the year 1856, with power to raise £9500; and to their securing a Provisional Order in 1872, and through it increasing their invested capital to £25,500, which was the limit. They had gone on until recently, when it was found that, not only had they raised the whole of this capital, but had over-spent it by £3762—bringing the amount of money invested to £29,262. They were thus bound to go to Parliament again; and they applied for powers which would have provided them with over £78,000. The Mexborough Council, however, decided to oppose, and had been extraordinarily successful—limiting the extended capital-raising powers to £33,000. The proposed standard price of 5s. per 1000 cubic feet was reduced to 3s. 6d.; and the Council secured the insertion of a very favourable purchase clause. By virtue of this clause, they were promoting a Bill in Parliament, and the Company could only oppose them on details—not on principle. The Bill was approved by a large majority; but Mr. Allen, a ratepayer and a shareholder in the Gas Company, demanded a poll, on the ground that the meeting had not been advertised sufficiently in the town. The Swinton electors also at their meeting approved of the Bill. There was, however, considerable opposition displayed to the proposal by some of those present; and after the voting, a poll was demanded.

The Faulty Chandelier Again.—Owing to an escape of gas from a faulty telescope chandelier, a gas explosion occurred on Monday night last week at the house of Mr. Augustus Ferrier, at Thames Ditton. Considerable damage was done to the building and its contents, and an elderly female servant sustained severe burns about the arms and feet.

Satisfactory Position of the Swadlincote Gas Undertaking.—In the course of his annual report upon the finances of the Swadlincote Urban District Council for the year ending March 31 last, the District Government Auditor (Mr. E. V. H. Weigall), referring to the gas undertaking, says: "In accordance with the arrangement I reported last year, a set of accounts, showing the profit and loss on the undertaking, is now incorporated in the Council's ledger, instead of merely receipts and payments, as hitherto. The undertaking shows a profit, after repayment of loans and interest, of £386 16s. 5d., contrasted with a loss of £1502 16s. 4d. in the previous year, which is entirely satisfactory. Sanctions to the extent of £4000 have been granted, as I understand, to repay revenue sums spent upon capital purposes, which, I hope, will be the means of providing a working balance. The prospects of the undertaking appear to have considerably improved; and credit is due to the Manager (Mr. G. B. Smedley) for the manner in which the work has been done."

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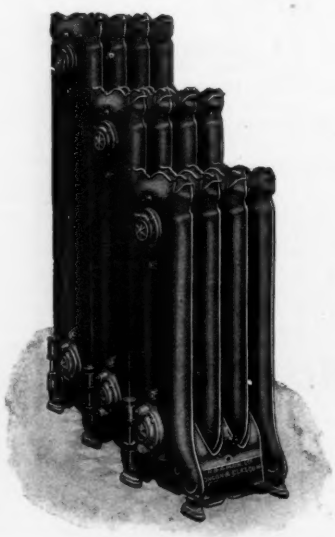

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A Gas Company Boycotted.

An extraordinary scene was witnessed last week in some of the towns in the vicinity of Paris, owing to the refusal of the inhabitants to use gas in consequence of a dispute with the supplying Company. The following account of the affair was furnished by the Paris correspondent of the "Standard" last Friday: "The Franco-Belgian Gas Company, who supply Juvisy and a number of other adjacent places with gas, recently turned a deaf ear to the consumers, who desired the price of gas to be reduced from 30c. to 20c. per cubic metre. In the first instance, the consumers appointed delegates, who waited upon M. Lesage, the Company's Manager, and proffered their request in formal terms. They were told that the Company were already in negotiation with the Municipality of Juvisy for a reduction from 30c. to 25c., and that they could only continue as before to treat through a municipal channel. The delegates felt that they had been snubbed, and communicated the result of the interview to the consumers, who thereupon determined upon a strike. Since Monday, in the houses of rich and poor alike, no gas has been used; and candles, petroleum, and acetylene have been resorted to for illuminating purposes. Even M. Argeliès, the Mayor of Juvisy, has joined the ranks of the malcontents, and has hung a lantern over his doorway as a sign of protest against the Company's attitude."

Suicide by Gas at Stretford.—Thomas Ecroyd, aged 48, a single man, of Stretford, was found dead in bed at his lodgings, with the end of an india-rubber tube under the bed clothes close to his mouth. The other end of the tube was attached to a gas-burner. At the inquest, the Coroner's Jury returned a verdict of "Suicide," but declined to express an opinion as to the state of the man's mind when he committed the act. It was said that deceased had not been depressed, nor was he in want. He had been out of employment since Christmas Eve; but it is reported that he had on the morning of his death received a post-card telling him that he could start work again with his former employers.

Complaints of the Halifax Gas Supply to Hipperholme.—Hipperholme and Lightcliffe are districts adjoining Halifax, and are supplied with gas by the Corporation. A member of the Hipperholme Council has been complaining, on behalf of some residents, of the quality and price of the gas supplied. The charge per 1000 cubic feet in Halifax is 2s. 1d., whereas at Hipperholme it is 2s. 10d. The Corporation have, it is stated, refused to lower this price owing to the cost of coal; but the Hipperholme Council have unanimously decided to ask the Corporation to reconsider the matter. It is rather vaguely (and probably erroneously) calculated that Hipperholme could make its own gas and supply it at the present price of 2s. 10d., and, in addition, relieve their rates to the extent of 6d. in the pound—no doubt an optimistic, but not seriously intended, estimate. At all events, no decision has yet been arrived at.

Pontypool Council and the Water Company.

At a special meeting of the Pontypool Urban District Council last week, the Committee who dealt with the recent litigation with the Pontypool Gas and Water Company submitted their report on the settlement effected, which included the payment of £4500 to a Joint Allocation Committee for distribution among the sufferers in the typhoid epidemic of two years ago. This Committee had transferred £1050 of that sum to the credit of the Pontypool Council. The considerations offered by the Company, and accepted by the Council, to induce the latter not to oppose the new Bill of the Company, were set forth as follows: (1) A constant-pressure water supply by gravitation in the Council's whole area. (2) Complete filtration of all water. (3) New remedies to the Council for default by the Company in quantity or quality of the water. (4) Certain agreed new works to provide for increased future supplies. (5) No increase of charges. (6) No over-capitalization beyond the actual requirement of the works. (7) No water sold out of the district to interfere with the constant-pressure supply in the Council's area. The Committee said they desired to emphasize the fact that the litigation settlement was a distinct matter, quite apart from the Council's attitude towards the Company's Bill. The Council's thanks were due to the Right Hon. R. M'Kenna, M.P., and to Alderman Raffan for initiating the settlement of the action.

Street Lighting at Cardiff.—So greatly is the change from the flat-flame to the incandescent system of public gas lighting at Cardiff being appreciated, that Mr. W. Harpur, the City Engineer, states that he is receiving from all sides demands for incandescent burners. As he has spent the £1000 already allotted for improved lighting, he suggests that provision be made in the next budget for £1500.

Improved Public Lighting in Hackney.—The General Purposes Committee of the Hackney Borough Council have been considering the necessity for improved lighting in the Lea Bridge Road, and have decided (subject to the usual sanction) to fit each of the 13 gas-lamps between Cornthwaite Road and Lea Bridge with an additional incandescent burner, to consume 4½ cubic feet of gas per hour, at an initial estimated cost of £8 2s. 6d. and an annual approximate cost of £30 4s. 6d. for lighting and maintenance.

Escaping Gas from a Holder Catches Fire at South Shields.—During a heavy gale on Monday night of last week, a gasholder near Tyne Dock, belonging to the North-Eastern Railway Company, tilted and allowed the contents to escape. On the gas which was rushing out becoming ignited by some means, a flame which could be seen from a long distance around shot up into the air. There was considerable alarm among the surrounding population, who apparently thought there might be an explosion; but, as a local paper remarked, the pressure of the gas inside the holder produced a continuous outflow, "which acted on the same principle as an ordinary gas-jet." No serious damage was done by the fire.

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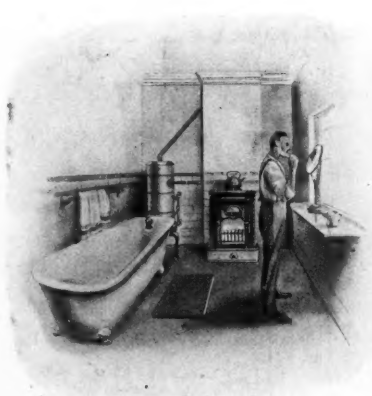
"A. B. C."



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Oswaldtwistle Gas Committee's Policy Vindicated.—The Oswaldtwistle District Council, at their meeting last week, approved of the recommendation of the Gas Committee that an expert should be engaged to inspect the gas plant and report thereon. It was explained by Mr. Hargreaves, on behalf of the Committee, that the calling in of an expert was not in any way a reflection upon the Gas Manager (Mr. J. H. Davies). Expert opinion had been taken, and, without going into details before the report had been presented, he felt justified in stating that the policy of the Committee and the Manager had been substantiated in every particular.

Ex-Police Constable as Meter Robber.—At the Middlesex Sessions last Saturday, before Mr. Herbert Nield, M.P. (Deputy-Chairman), Walter Pope, 41, painter, and George White, 24, bricklayer, were convicted of stealing 2s. 2d. in money, the property of the Enfield Gas Company, and with feloniously receiving the same. Pope was sentenced to twelve months' hard labour, and White to three years' penal servitude and two years' police supervision. Both men had been previously convicted. Pope had been a constable for fifteen years, but was compelled to resign; and it was stated that he had for three years been using his knowledge of the force for the benefit of thieves like his fellow-prisoner.

Additional Storage at the Wicklow Gas-Works.—There has recently been completed at the Wicklow Gas-Works the inner lift of a new three-lift gasholder, which with the larger of the two existing holders (which is being retained) will provide storage for practically a maximum 24 hours' demand, instead of only 60 per cent. as in the past year. A point in connection with the new holder is that, though it was put up under a contract entrusted to the Barrowfield Iron-Works, Limited, with the exception of a few skilled riveters, local labour was abundantly employed; while the foundations, retaining wall, &c., were all carried out by men in the locality employed by the Gas Company. The whole of the work was done under the direct supervision of the Resident Manager (Mr. J. F. Tyndall); the Engineer being Mr. George W. Anderson, of Messrs. Anderson Bros., of Westminster.

Middleton Gas-Works Extensions.—In the course of a Local Government Board inquiry which was held a few days ago at Middleton regarding an application of the Corporation for sanction to the borrowing of £16,620 for the purpose of carrying out extensions of the gas undertaking, the Town Clerk (Mr. Entwistle) informed the Inspector that during the recent foggy weather there was great danger of having the town in darkness. The Gas Committee had therefore been compelled to approach the Oldham Corporation with a view to securing an emergency supply. The consumption, he said, had gone up from 85 million cubic feet in 1896 to 124 millions last year, which was an increase of 46 per cent.; and the plant was insufficient to meet this expansion. The Inspector (Mr. T. H. Tulloch) expressed the opinion that in the circumstances the application ought to have been made years ago, instead of being left over until the last moment.

Standing Order Proofs in Connection with Private Bills.—Saturday, the 9th inst., was the last day for the deposit of memorials complaining of non-compliance with Standing Orders in the case of the first hundred in the list of petitions for Private Bills for next session. On that day memorials had been received in respect of the Ammanford Gas Bill, from the Amman Valley Gas Company; and of the West Gloucestershire Water Bill, from the Bristol Water Company. In the case of the first-named Bill, the memorialists allege that the statutory notice given by the promoters in November was defective, inasmuch as it did not state the objects of the intended Bill. In support of this allegation, they refer to the clauses relating to the proposed dissolution of their own Company, and to other clauses relating to the transfer of their undertaking to the Company proposed to be incorporated.

Overtime and Unemployment at Walsall.—The Mayor of Walsall (Mr. W. Millerchip), referring, as Chairman of the Gas Committee, to a letter which had been received from the local Trades Council protesting against the men engaged at the gas-works being allowed to put in overtime while employment could not be found for other men who had been suspended during the summer months, said that, owing to a reduction of over 8 million cubic feet in the amount of gas produced, the Committee had been unable to put on any extra men during the winter months. They were, however, anxious to relieve the hardship as much as possible, and had given specific instructions that overtime should not be allowed where it was possible to bring in other men to do the work. Wherever practicable, this had been carried out; and where men had been employed on overtime, it was absolutely needful.

Court Lighting at Coventry.—The question of the lighting of courts came before the Coventry Town Council at their last meeting, when it was reported that the Watch Committee had decided that a circular should be addressed to owners of property in courts and jetties containing ten houses or more, calling attention to the offer made by the Council in 1890 to provide a lamp in each such court or jetty if the owners would agree in writing to pay £1 11s. 9d. per annum (being one-half the cost of the lamp, and the whole of the cost of laying the service-pipes), subject to the position of the lamps being decided by the Street Lighting Sub-Committee. Alderman Drinkwater, in now bringing the matter before the Council, said that nineteen years ago he induced the Council to pass a resolution on similar lines. He urged that it was very desirable that these courts should be lighted, particularly those through which there was a right-of-way. If they were to light the whole of the courts on private property, it would mean the placing of about 500 lamps there. Mr. Poole inquired if the Council possessed any compulsory powers in this respect; and he suggested that if they did not, they should take steps to secure them in their next Act of Parliament. The Town Clerk replied that the Council were already in possession of powers, but it had been thought better in the first instance to try conciliatory measures with the property owners. Mr. Snape said there was no question that the lighting of these courts tended to a considerable moral improvement of the people dwelling in them. The Council approved the action of the Committee.

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Convalescent Home,

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WE HAVE AN EXTENSIVE RANGE of COOKING APPLIANCES suitable for HOSPITALS, HOTELS, RESTAURANTS, WORKS MESS-ROOMS, Etc., Etc., and shall be glad to forward Drawings and Prices, or Designs to suit Customers' Particular Requirements.

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(Incorporating Maughan's Patent Geyser Co.),

BIRMINGHAM:
STOUR ST., SPRING HILL.

LONDON:
Office & Show-Room: 129, HIGH HOLBORN, W.C.

Abolition of Bye-Passes in Wandsworth.—The Engineer of the Wandsworth and Putney Gas Company (Mr. H. O. Carr) recently wrote to the Wandsworth Borough Council stating that lamps fitted with bye-passes occasionally cause some slight trouble, but that they are now just as easily lit by flashlight torches. He pointed out that the abolition of the bye-passes to the street-lamps in the Company's lighting area would effect a saving of £75 per annum; and he asked the Council's permission to carry out the work free of cost—the reduced charge for the lamps to come into operation immediately after quarter-day. On the recommendation of the Highways Committee, the Council have authorized the Company to make the necessary alterations.

Brixham Water Supply.—An inquiry was held at Brixham last Tuesday by Major J. Stewart, an Inspector of the Local Government Board, in regard to an application by the Urban District Council for a loan of £1585 on account of water-works. Mr. J. L. Arlidge, the Clerk to the Council, explained that in 1905 a loan of £7350 was granted for the purpose of enabling the town to take advantage of the agreement which had been made with the Paignton District Council for a supply of water from the new works which that body had constructed on Dartmoor. Practically the whole of the work had been completed; and as the result the higher levels of the town now had a supply of water. Extra expenses had been incurred by the extension of the mains in districts not included in the original application, and by the erection of a boundary wall instead of a hedge at the reservoir. Difficulties had been experienced in connection with the contract; but the loss fell upon the Contractor and not the Council. Mr. F. W. Vanstone, the Engineer of the scheme, explained in detail the cause of the excess in the expenditure, and said there had been no deviation from the original plans.

The fusing of an electric cable in a distributing box in Tokenhouse Yard, last Sunday night, caused an alarming explosion; but the fire which resulted was soon extinguished by the firemen from Cannon Street by means of sand.

By an overwhelming majority, a parish meeting held at Crowthorne last week decided in favour of the Parish Council adopting the Lighting and Watching Act, 1833. This means that the delightful neighbourhood, which comprises Wellington College and Broadmoor, will soon enjoy the benefits of gas-lamps along the roads.

The failure of the current on the Landport section of the Portsmouth Corporation electricity supply was recently the cause of much inconvenience. For some time the head post office and many business houses were left in darkness; and as it was the day for the weekly half holiday in the town, there was great difficulty in obtaining candles as temporary illuminants.

During the past winter, the Bakewell Gas Department, through increased sales, have been short of holder accommodation; and the Gas Committee having considered the matter, have given instructions to their Manager (Mr. T. W. Tiplady) to prepare plans and specifications for adding another lift to one of the gasholders, and also for a new gasholder in steel tank.

As showing the varied use of the gas-steam radiator, it may be mentioned that the Richmond Gas Stove and Meter Company, Limited, have recently supplied, among many others, nine of their "Monarch" series for a Roman Catholic church, eight for a mission church, thirty-four for a large hotel, nine for co-operative stores, and twelve for a well-known London drapery establishment.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

REPRESENTATIVES (MANTLES). No. 5046.

Situations Wanted.

ASSISTANT-MANAGER. E. Sainter, Gas Works, Longwood.
CONFIDENTIAL POST BY RETIRED LONDON WATER OFFICER. No. 5043.
CHANGE DESIRED BY ASSISTANT. No. 5047.
ERECTION OF PLANT (TAR DISTILLING AND AMMONIA). No. 5045.
GENERAL OFFICE CLERK. Mobsby, 235, Friern Road, Dulwich.
SECRETARY AND MANAGER (WATER-WORKS). No. 5040.
SHORTHAND TYPIST. Wessendorff, 48, Dunlace Road, Clapton.

Agencies Wanted. No. 5044.

Plant, &c. (Second-Hand), for Sale.

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Plant, &c. (Second-Hand), Wanted.

PHOTOMETER. Centenary Gas Company.

Patent Licences, &c.

GAS PRODUCERS. Haseltine, Lake, and Co.
KILN FOR THE GASIFICATION OR DISITILLATION OF PEAT. S. F. Paul and Co.

Meeting.

SOUTH METROPOLITAN GAS COMPANY. De Keyser's Hotel. Feb. 10. Two o'clock.

Stocks and Shares.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY. Feb. 2.
BOGNOR GAS COMPANY. Feb. 2.
DRAYCOTT GAS COMPANY. Jan. 27.
ST. MARGARET'S GAS COMPANY. Feb. 2.
YARMOUTH WATER COMPANY. Feb. 2.

TENDERS FOR

Coke.

OSWALDTWISTLE URBAN DISTRICT COUNCIL. Tenders by Jan. 25.

Coal Breaker and Elevator.

SOUTHEND GAS COMPANY. Tenders by Jan. 25.

Condensers.

SOUTHEND GAS COMPANY. Tenders by Jan. 25.

Engine House, Filter-Beds, &c.

HOLYHEAD WATER COMPANY. Tenders by Feb. 1.

Exhauster and Steam Engine.

RHYL GAS DEPARTMENT. Tenders by Feb. 3.

Gasholder.

RHYL GAS DEPARTMENT. Tenders by Feb. 3.

Iron and Steel Works.

SOUTHEND GAS COMPANY. Tenders by Jan. 25.

Mantles, &c.

PLYMOUTH LIGHTING DEPARTMENT. Tenders by Jan. 30.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 160.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 15	10	Alliance & Dublin 10 p.c.	18½–19	..	5 5 3
268,324	10	,,	7	Do. 7 p.c.	12¾–13¼	..	5 5 8
310,000	Stk.	Jan. 14	4	Do. 4 p.c. Deb.	9*–100*	..	4 0 0
200,000	5	Oct. 29	6⅛	Bombay, Ltd.	5⅞–5⅞	..	5 10 8
40,000	5	,,	6⅛	Do. New, £4 paid	3⅛–4⅛	..	6 6 1
50,000	10	Aug. 27	14	Bournemouth Gas & Water B 7 p.c.	20–30	..	4 13 4
51,810	10	,,	7	Pref. 6 p.c.	16⅝–17	..	4 2 4
53,200	1	,,	6		15⅞–16¼	..	3 13 10
380,000	Stk.	Aug. 13	12½	Brentford Consolidated	247–250	..	5 0 0
300,000	,,	,,	5⅞	Do. New	187–190	..	5 0 0
50,000	,,	,,	5	Do. 5 p.c. Pref.	122–124	..	4 0 8
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb.	100–102	..	3 18 5
220,000	Stk.	Sep. 11	10⅔	Brighton & Hove Orig.	213–216	..	4 9 6
246,320	,,	,,	7⅛	Do. A Ord. Stk.	153–156	..	4 19 4
467,000	20	Oct. 15	10	British	42½–43½	..	4 11 11
109,000	Stk.	Aug. 27	6	Bromley, Ord. 5 p.c.	114–116	..	5 3 5
165,700	,,	,,	4⅛	Do. do. 3½ p.c.	84–86	..	5 4 8
500,000	10	Oct. 15	7	Buenos Ayres (New) Ltd.	11⅛–12	..	5 16 8
250,000	Stk.	Dec. 11	4	Do. 4 p.c. Deb.	93–95	+1	4 4 3
150,000	20	July 15	7½	Cagliari Ltd.	25⅛–26½	..	5 9 5
102,000	10	—	—	Cape Town & Dis., Ltd.	4⅛–5⅛	..	—
100,000	10	Apl. 26	4½	Do. 4½ p.c. Pref.	4⅜–5⅛	..	8 3 8
52,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	47–49	..	6 2 5
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	76–78	..	5 15 5
157,150	Stk.	Aug. 13	5	Chester 5 p.c. Ord.	110½–112½	..	4 8 11
1,491,280	Stk.	Aug. 27	5⅞	Commercial 4 p.c. Stk.	106–108	..	4 16 4
562,000	,,	,,	5	Do. 3½ p.c. do.	103–105	..	4 15 3
475,000	,,	Dec. 11	3	Do. 3 p.c. Deb. Stk.	81–83	..	3 12 3
800,000	Stk.	,,	6⅛	Continental Union, Ltd.	101–103	+2	6 6 3
200,000	,,	,,	7	Do. 7 p.c. Pref.	135–138	..	5 1 5
467,170	Stk.	—	5	Derby Con. Stk.	122–124	..	4 0 8
55,000	,,	—	4	Do. Deb. Stk.	103–105	..	3 16 2
143,995	,,	Sep. 30	5	East Hull 5 p.c. Ord.	98–100	..	5 0 0
486,090	10	July 15	12	European, Ltd.	23⅝–24½	..	4 19 0
354,060	10	,,	12	Do. £7 10s. paid.	17½–18	..	5 0 0
15,182,590	Stk.	Aug. 13	4/ 0/8	Gas light and Coke 4 p.c. Ord.	102–103	+1	4 7 11
2,600,000	,,	,,	3½	3½ p.c. max.	89½–90½	..	3 17 4
3,793,735	,,	,,	4	4 p.c. Con. Pref.	106½–107½	..	3 14 5
4,193,975	,,	Dec. 11	3	3 p.c. Con. Deb.	84½–85½	..	3 10 2
258,740	Stk.	Sep. 11	4⅝	Hastings & St. L. 3½ p.c.	95–97	..	4 17 11
82,530	,,	,,	£4	Do. do. 5 p.c.	113–115	..	5 8 8
70,000	10	Oct 15	11	Hongkong & China Ltd.	18–18½	..	5 18 11
123,500	Stk.	Sep. 11	6⅛	Ilford "A" and "C"	131–133	..	4 17 9
65,780	,,	,,	5	Do. "B"	103–105	..	4 15 3
51,000	,,	Dec. 30	4	Do. 4 p.c. Deb.	102–104	..	3 16 11
4,940,000	Stk.	Nov. 13	8	Imperial Continental	179–181	..	4 8 5
473,600	Stk.	Aug. 13	3⅛	Do. 3½ p.c. Deb. Red.	95–97	..	3 12 2
195,242	Stk.	Aug. 27	6	Lea Bridge Ord. 5 p.c.	120–122	..	4 18 4

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
561,000	Stk.	Aug. 27	10	Liverpool United A	230–232	+4	4 6 2
718,100	,,	,,	7	Do. B	169–171	+2½	4 1 10
306,083	,,	Dec. 30	4	Do. Deb. Stk.	105–107	..	3 14 9
75,000	5	Dec. 11	6	Malta & Medn., Ltd	4⅜–4⅝	..	6 3 1
50,000	100	Oct. 1	5	Met. of 5 p.c. Deb	100–102	..	4 18 0
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	100–102	..	4 8 3
541,920	20	Nov. 13	3⅛	Monte Video, Ltd.	11½–12	..	5 16 8
1,775,892	Stk.	July 30	4/12/6	Newcastle & G't sh'd Con.	109–111	..	4 3 4
418,460	Stk.	Dec. 30	3⅛	Do. 3½ p.c. Deb.	91–92	..	3 16 1
15,000	10	Aug. 27	10	North Middlesex 10 p.c.	20–20½	..	4 17 6
55,940	10	,,	7	Do. 7 p.c.	13⅜–14	..	5 0 0
300,000	Stk.	Nov. 27	8	Oriental, Ltd.	140–142	..	5 12 8
60,000	5	Sept. 30	8	Ottoman, Ltd.	6⅛–6⅜	..	6 5 6
3,800	53	Aug. 27	13	Portsea Island A.	138–140	..	4 18 6
60,000	50	,,	13	Do. B.	132–134	..	4 17 0
100,000	50	,,	12	Do. C.	122–124	..	4 16 9
114,800	50	,,	10	Do. D and E.	104–106	..	4 14 4
398,490	5	Oct. 29	7	Primitiva Cr'd.	5⅛–6	..	5 16 8
796,850	5	July 30	5	Do. 5 p.c Pref.	5⅛–5⅜	+⅛	4 13 0
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	95–97	..	4 2 6
1,100,000	10	Oct. 15	8	River Plate Ord.	13¾–15¾	..	5 16 5
312,650	Stk	Dec. 30	4	Do. 4 p.c. Deb.	93–95	..	4 4 3
250,000	0	Sept. 30	8	San Paulo, Ltd.	14–14¼	..	5 12 3
125,000	50	Jan. 2	5	Do 5 p.c. Deb.	49–50	..	5 0 0
135,000	Stk	Sept. 11	10	Sheffield A	240–242	..	4 2 8
209,981	,,	,,	10	Do. B	240–242	..	4 2 8
523,500	,,	,,	10	Do. C	238–240	−2	4 3 4
70,000	10	Oct. 29	10	South African	13½–14	..	7 2 10
6,429,893	Stk.	Aug. 13	5/6/8	South Met., 4 p.c. Ord.	121–123	+½	4 6 8
1,895,445	,,	Jan. 14	3	Do. 3 p.c. Deb.	84–85*	..	3 10 7
209,820	Stk	Aug. 31	8	South Shields Co. Stk.	153–155	..	5 3 3
605,000	Stk.	Aug. 13	5/6/8	S'th Suburb'n Ord. 5 p.c.	118–120	..	4 8 10
60,000	,,	,,	5	Do. 5 p.c. Pref.	21–123	..	4 1 4
117,058	,,	Jan. 14	5	Do. 5 p.c. Deb. Stk.	122–124*	+½	4 0 8
502,310	Stk.	Nov. 13	5	Southampton Ord.	107–109	..	4 11 9
120,000	Stk.	Aug. 13	6¾	Tottenham A 5 p.c. and B 3½ p.c.	134–136	..	4 19 3
398,940	,,	,,	5¼		106–108	..	4 17 3
149,470	,,	Dec. 30	4	Edmonton 4 p.c. Deb.	100–102	..	3 18 5
122,300	1	,,	8	Tuscan, Ltd.	8¾–9¼	−¼	8 13 0
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	98–100	..	5 0 0
193,742	Stk.	Aug. 27	5	Tyn mouth, 5 p.c. max.	106–108	..	4 12 7
255,660	Stk.	Aug. 27	6½	Wandsworth B 3½ p.c. and 3 p.c. Deb. Stk.	128–130	..	5 0 0
79,416	,,	Dec. 30	3		72–74	..	4 1 1
835,872	,,	Aug. 27	5⅛	Putney West Ham 5 p.c. Ord.	112–114	..	4 9 11
210,000	,,	,,	5	Do. 5 p.c. Pref.	124–126	..	3 19 4
253,300	,,	Dec. 30	4	Do. 4 p.c. Deb. Stk.	105–107	..	3 14 9

Prices marked * are "Ex div."

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No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

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EDITORIAL NOTES—GAS, &c.

Spiral-Guiding for Large Capacity Holders.

"SUCH experiences as these serve to illustrate the revenges "of time." The words were used by Mr. William Gadd nearly two years ago before the North of England Gas Managers' Association. He was speaking specially of the experiences with spiral-guided holders, which experiences had long before that time effectually put silence upon his critics. By increasing capacities, by widely differing diameters and heights, in a variety of situations the world over, including mining districts subject to settlement and other moving strata, and under a variety of climatic influences that must take in the whole possible range short of earthquakes, the system of spirally guiding gasholders had confirmed the original claim made for it as being sound, both scientifically and practically. The two years that have elapsed have added substantially to the experiences of stability, of smoothness of working, and of freedom from anxiety at all times, even in the most disturbed condition of the elements. Hitherto capacities of holders guided in this manner have run from comparatively low figures as storage capacities go nowadays up to 1½ million cubic feet. Now and ever since November last, under an extraordinary medley of heavy rain, snow, and wind storms, of the severity that the north-east part of the country knows only too well, there has been working at Newcastle-on-Tyne—where the words quoted in the opening lines were uttered two years since—a holder of 3½ million cubic feet capacity. The holder has at times been working under the abnormal condition of having gas extracted from it by exhausters at a rate which causes a descent of from 20 to 25 feet per hour. It is a big leap in capacity from 1½ to 3½ millions; and the Directors of the Newcastle and Gateshead Gas Company and Mr. W. Doig Gibb, their Chief Engineer, are worthy to-day the special regard of the whole gas engineering profession for the demonstration of the applicability of the system to holders of the larger dimensions. The event and the successful experience, under such harsh, turbulent conditions as those in which the holder commenced service, will cause gas engineers who have to provide storage for the millions, instead of the tens or the hundreds of thousands, to consider afresh the claims of the spiral system.

When this fresh exponent of the merits of the system is examined at Newcastle, the thought occurs how close from the first was Mr. Gadd to correct principles in making a radical departure from the conventional mode of constructing holders that in the main had persisted from the second decade of last century. The fundamental principles that he enunciated some twenty years ago have never been even in part abandoned in any of the 300 or so spirally-guided holders that have existence to-day in the two hemispheres. There have only been changes and improvements in matters of detail. Guide-rails that were formerly placed inside the holder have been brought outside; rollers that were fixed in inaccessible positions are made accessible; movement without loss of roller grip on the rails has been given to the axles of rollers so as to negotiate expansion and contraction, rail-plates have been introduced to give strength and to make a tight joint with the holder plates; and in many other minor ways improvement has followed the disclosures of experience. With such enhancing exceptions, the original simplicity of Mr. Gadd's radical departure in gasholder guiding remains. True the inventor himself, a couple of years ago, introduced a method of giving a vertical motion to the holder while retaining the spiral rails for support, with the primary object of preventing damage to the standpipes in the holder by the spiral motion of the structure in the event of the surface of the tank water becoming frozen over. But the proposed change does not appear to have met with any hearty reception at the hands of engineers—savouring as it does of a complication to attain an end that can be achieved in a simpler manner. At the moment we cannot call to mind a single instance of the application of the new idea. The fact may be taken as a compliment to Mr. Gadd's brilliant conception and method of execution of twenty years ago. He then solved problems correctly, and planned practically, leaving only to working experience those comparatively minor adjustments and changes to which reference has been made. An illustrated description of the Newcastle 3½ million spiral-guided holder is published in the present issue.

From the Suction-Gas Point of View.

WELCOME is given to the article that appears on other pages this week, on "Town Gas, Producer Gas, and Electricity," from the pen of Mr. Philip W. Robson, who is well known for his advocacy of the gas-engine, and for his decided inclination to the combination therewith of suction-gas plant, and yet possessing—and wisely—a sufficiently broad mind to remain on the most friendly terms with the town-gas industry. His article is interesting as showing with distinctness how present interests shape a man's point of view, and how the point of view circumscribes judgment and deductions. The conclusions at which Mr. Robson has arrived from the survey made of the subject, from his particular standpoint, are concentrated in his final paragraphs. But having regard to the trend of events to-day, and weighing the arguments of the writer, it is found that neither the trend nor the arguments support him in his plotting out of the "legitimate spheres" of the three competitors—town gas, producer gas, and electricity. There is agreement with much that our contributor says; and we must treat him, as we have known him of old, as friendly to the gas industry, but an ardent partizan of producer gas. There is not the same incongruity between the two positions as there would be if, in the place of "producer gas," there had been the necessity to insert the word "electricity."

Now what are the "legitimate spheres" of the three competitors from Mr. Robson's point of view? He considers that modifications in the nature of the public supply of gas will enable every householder to enormously increase his demand for gas to be used for heating and cooking. This, again in his view, will cause the importance of gas lighting to shrink, and to admit of the extended use of electric lighting, on account of its cleanliness and convenience; while producer gas has a special sphere for power users and for many industrial purposes. Now we submit that these very modifications in the nature of the public supply of gas which our contributor considers will enormously increase the demand for heating and cooking, will have an effect diametrically opposite to that of causing the importance of gas lighting to shrink, but will increase the potency of gas as a competitor with electricity for lighting and with producer gas for power and for other industrial processes. In saying this, there is vaguely set forth the objective of the gas industry to-day, progress towards which will make its prime commodity of greater advantage to all classes of users. The aim is an ambitious, a legitimate, and not an impossible one. Invention is being directed to that end; and Parliament is unremittingly being asked to supplement the internal efforts of the industry. And what is more, we are vain enough to encourage the hope of ultimate success. Anyway, there will be no relinquishing of endeavour.

We are not going to quarrel with Mr. Robson over certain of his incidental remarks—for example, his suggestion that gas engineers are not always impartial where the proper claims of electricity or producer gas are to be considered. People who live in glass houses—for instance, producer gas people—are not in a position to indulge in the pastime of throwing stones. However, all such observations in the article may be bye-passed, and other points be brought into review, although several interesting ones must be omitted on account of the extent of the ground covered. As already

intimated, we cannot correctly trace the relationship between Mr. Robson's conclusions and his arguments. In the former, as has been seen, he thinks that, if the nature of town gas is modified, so as to enable it to be used more for cooking and heating, this will admit of the extended use of the electric light on account of its cleanliness and convenience. But in his article he, in effect, says that electricity is still a luxury beyond the reach of the greater masses of the people. The expensiveness of electric lighting for private purposes is attributable (most observers know) to several factors other than the one that many electricity undertakings are following a suicidal policy in respect of the prices at which they are supplying energy for power purposes, though that is unquestionably one of the most important. But this condition of things increases the stability of the gas industry in the lighting business; and if there is not an early cutting of the painter between many electricity undertakings and their present policy, we may look to advantage still accruing from the same cause to gas lighting. Our contributor, in surveying the position in this connection, takes but narrowly into account the gains of gas in cost and efficiency through the improvements made in the means of utilization for illuminating purposes—not only for street lighting, but for domestic purposes. It is a matter to which, in all its aspects, he should devote more study, even in respect of the point of cleanliness under the most modern conditions of the regulated use of the lower illuminating grade of gas in the inverted burner. Why he should think that gas should shrink in its application for interior lighting under a modification of the nature of gas supply is not apparent from his argument. The gas that is cheap and good for heating purposes is the gas that is cheap and good for use in the bunsen burner for incandescing mantles. The decreased cost of the combustible and the increasing efficiency of the appliances used will, we hold, maintain the supremacy of gas for all forms of illumination.

It is not surprising—seeing that we take in this matter similar points of view—that Mr. Robson is in complete accord with us on the question of the vicious policy of electricity suppliers in regard to power supply; and equally it is not astonishing that on many points in respect of suction-gas plant there is disagreement. "Many thousands of suction-"gas plants are in actual operation, and have given every "success on account of their low cost of working." "Every "success" is hardly predicable from the single merit of low working costs. Gas manufacturers, with service-pipes and meters through which pass an intermittent supply of gas to engines coupled up to suction-gas plants, can tell another phase of the tale of "every success;" and negotiations for supplies of gas on tap by manufacturers who have suction-gas plants also tell of an experience that is not summed up in the cost per brake horse power that was the original determining factor in installing the plants. But we quite agree that the suction-gas plant has, to use Mr. Robson's expression, at a critical time in power competition, retained in many places a substantial part of the field for the gas-engine. The gas industry is to that extent under obligation to suction-gas plant for what it has done. But the makers of the plant have something for consideration in Mr. Robson's words: "If in the course of time the de-"mand for a cheap heating gas for domestic purposes is "altogether greater than that for a rich lighting gas . . . "the use of town gas for engines will again become general." Treating the gas used in bunsen burners for incandescing mantles as heating gas, the essential condition has already arrived; the work that is energetically proceeding in the gas industry is to cheapen this heating gas. Of these points, the gas-engine makers should take heed.

It must, on further reflection, be conceded by Mr. Robson that the position of the town-gas industry in the competition is a strong one, and that neither of the competitors has the same substantial backing to prospects. Town gas stands high as an economical, efficient, trustworthy lighting agent; it has a large day business in summer in cooking, and in winter for both cooking and heating; and it has not a negligible business in power and other industrial uses. In power, Mr. Dugald Clerk has estimated that the business equals 15 to 20 per cent. of the town-gas production of the country; and in that is one answer to the question, "Why "should gas managers worry about a few power consumers "when there is so much other business to be done?" No other competitor can claim such a diversity of day and night—and all paying—business at the present time; no competitor can claim the same heat efficiency in the whole range of cooking, heating, and industrial uses; nor can electricity or suction gas claim the same degree of reliability or constancy. Therefore—holding this position in the competition, and with energy and intelligence directed to the production of the class of gas that Mr. Robson has in his mind's eye, given also the aid of a considerate Parliament, and pursuing the modern belief of gas administrators that the industrial and domestic branches of business must be conducted with an eye upon the nature of the competition to be met, but always ensuring some reward in the way of profit—the gas industry is not, nor will it ever be, so far as can be foreseen, inclined to limit itself even partially to that "legitimate sphere" that our well-disposed contributor marks out for it. The legitimate sphere for town gas has no boundary lines; and there is no sign of any intention of submitting to restriction. The vane pointing the course of the gas industry seems to have got locked in the contrary direction.

The Local Authority in Gas Supply.

THERE is abundant evidence of the changing views and thoughts of the times in relation to gas supply in the Bills that are being promoted by local authorities for the coming session. When gas companies are in Parliament, the belief is usually professed by local authorities who are not gas-works owners, that much of what is being asked for is prompted by some selfish motive. But how far this is true could often be determined by ascertaining what a local authority would do were they in the position of the company in question. Place local authority Bill by the side of gas company Bill, and merely exclude the necessarily different financial conditions, and it will be remarked that the proposals of the one are as much like those of the other as the peas in one pod. Local authorities have assumed a mightily astonished visage at the so-called temerity, wickedness, and perfidy of gas companies in taking what the former have been pleased to call the retrograde movement of reducing the illuminating power of gas to 14 candles, as tested by the "Metropolitan" No. 2 burner. The criticism of past sessions will doubtless be the criticism in the one before us. But let local authorities be, or become, the owners of the gas-works, and then what happens? Look at the local authority Bills of this session for the answer in respect of illuminating power and testing. Bill after Bill, with one exception, proposes 14-candle gas, and the use of the "Metropolitan" No. 2 burner for determining the illuminating power. And the exception, what of that? It is the Bury Corporation Bill; and the Bury Corporation will be quite content to trust the fortunes of their gas undertaking to a 12-candle standard. Why is this? Local authorities owning gas undertakings know full well that at present there is more gas used for purposes in which the calorific value is of greater importance than the illuminating value—in other words, that illuminating power *per se* is of rapidly diminishing consequence; and, moreover, that the trend of all carbonizing work nowadays is towards the cheapening of the heat units that the major part of the customers for gas want for the purposes to which they put the gas purchased. Parliament, too, has accepted these progressive views; and it is simply wasting energy to kick against hard facts and a policy accepted by Legislature and the industry alike as being essential to the times and the ruling conditions.

Perhaps the most notable aspect of the Local Authority Bills for the session near at hand (the review of which Bills commences in our columns to-day) is the revived testimony to the favour of gas undertakings in the municipal eye as being very desirable property. Instead of knocking gas from the pinnacle of favour as a municipal investment, experience in electricity supply has only tended to establish it more firmly in its position; and local authorities are still found who harbour regret that they did not become owners of the gas property in their localities before it attained such dimensions and value, while others are prepared, where the circumstances permit of their contemplating the project, to immediately take over the local supply. Bradford introduced a Bill for a number of purposes—including the purchase of the Pudsey and the Drighlington and Gildersome Gas Companies, and a private works in the possession of the Ripley family. But the ratepayers have rejected the measure lock, stock, and barrel. There is no question that the attitude of the present Parliament has put heart into local authorities on the subject of municipalization; for in the remaining Bills proposing purchase are found projects for

the compulsory acquisition of both statutory and limited concerns. The promoting authorities hail from Fermoy, Lisburn, Prestatyn, Risca, Sheringham, and Swinton and Mexborough. The Prestatyn Council openly accuse the present owner of the works with allowing them to get into a bad and inefficient condition; but a Provisional Order promoted by the owner indicates the desire to have the means of putting the concern into proper order. The Risca Council are dissatisfied with the Western Valleys (Mon.) Water and Gas Company, and are also sanguine that, if accorded the necessary legislative permission, they can do better than the Company have done for the district. Parliament last year made it quite clear that—though the long-established custom holds good, of refusing compulsory purchase powers in the case of statutory companies with clean record—where there has been proved abuse of parliamentary privileges, or want of consideration for the district, they will not hesitate to grant local authorities compulsory purchase powers. Hence, under the permissive powers with which the Swinton and Mexborough Councils were last session endowed in the Gas Company's Bill, they are forward this year with a measure for purchase and the formation of a Gas Board. There is nothing to be said respecting the purchase provisions in the Bills, save that, in the event of the purchase price being submitted to arbitration, the plan of each party being represented by only one counsel, one expert engineer, and one accountant, in addition to officers in regular employ, has the growing regard of promoters.

There has not been much enthusiasm over purchase for some few years. The high prices that gas undertakings fetched under arbitration, the hope that at one time existed that the municipal electricity undertakings would depreciate the value of the gas undertakings, and the animosity that the public has acutely displayed towards municipalization owing to the growth of the rates through local maladministration and prodigality, were all factors that asserted themselves in the matter of temporary restraint. But the longing for possession, if we may take the coming session's promotions as an augury, is lifting itself again above the horizon of the local political view, though it would soon sink again if Parliament eliminated from the purposes to which revenue balances may be applied, the transfer to the district fund of any sum remaining after other claims are satisfied. The preambles of certain of the Bills state that the object in acquiring the undertakings is to give a more "economical "and efficient" supply of gas in the localities. If that were the primary object, then to it should be devoted, to the advantage of the district, all surplus funds. That is what is decreed in connection with the Potteries federation scheme; and it is the practice of the Legislature in the case of Gas Boards. The Swinton and Mexborough Board, however, are desirous of being in the position to apply surpluses to the reduction of price or to share them equally between the two authorities. All the Bills provide that deficits shall be made good out of the general district fund; but the official returns show how little deficit there is arising from municipal gas supply, and how easily the balance can always be brought on to the right side through the flexibility of the charge for gas.

Managers of gas undertakings as a rule watch carefully that there are no loose ends in the business that are unprofitable; and local authorities appear to be specially keen on this head in connection with gas supply, if they are not in other directions of municipal venture. Thus we see in the case of three of the local authority Bills that, in the prepayment clause, the promoters are asking that, where coin meters are provided and the receipts do not give, through the excess price, a 10 per cent. return on the capital expenditure to meet the outlay entailed by the system, they should have power to make up the 10 per cent. by an additional charge. This is a matter over which there might be argument as to whether it would not be better, all things considered, to permit it to remain in a state of quiescence, as no gas suppliers have any particular desire to see the system complicated by having the reverse proposal imposed upon them in the case of prepayment consumers who are excellent customers. In the Bury Bill, it is proposed that upon the consumer shall rest the liability for any difference between the value of the gas consumed and the amount of money found in the meter-box. There is not the same objection to this, though such a power would, among poor people, have to be used with discretion if it is desired to avoid alarm and dissatisfaction.

It is a pleasure to see that certain of the local authorities are keeping alive the question of the unjust difference that is made between gas and electricity purveyors in the matter of stand-by supplies. Both the Heywood and the Mountain Ash Bills incorporate clauses asking that, where premises have a private or independent supply of gas, and the owner requires the service of town gas merely as a protection to meet the deficiencies and failures of the private supply, a minimum sum may be charged for the service, to compensate the capital expenditure and standing charges incurred by the Gas Departments to meet possible maximum demands for the premises. In default of agreement, the Heywood Corporation propose that the minimum annual sum shall be determined by a Petty Sessional Court; in the case of the Mountain Ash Council, by arbitration in the manner provided by the Arbitration Act, 1889. The Heywood Corporation further desire that the power may apply to stand-by gas supplies where electricity is used, whether obtained from private plant or from the Corporation cables. We admire the consistency displayed in this proposal.

Another development of modern times which has been brought to the front by the municipal traffic in electricity fittings and the agitation of the electrical contractors, is conspicuous in the local authority Gas Bills. The parliamentary authorities have come to the conclusion that what is good in this instance in the case of municipal electricity supply, will be equally good in the case of municipal gas supply; but they are inconsistent in differentiating between the two in the matter of stand-by supplies. Following what had been done in the case of several municipal electricity undertakings, the parliamentary authorities, at the close of the 1907 session, determined that, in respect of both electricity and gas, when fittings supply powers were desired, the conditions should be attached that the work should be given out to contractors, that the revenue from the fittings business should be so adjusted that it covered all outgoings, and that the accounts for this auxiliary business should be kept separate. The operative clause is found in several of the Municipal Gas Bills of this session, but, in the majority of instances, less the condition that the work should be done through a contractor. There is a very good case why this condition should not be rigorously enforced.

The only other noteworthy points are the large schemes of gas-works extension that Salford is contemplating, and the new gas storage plant, residuals plant, and main extensions that Oldham has in view, together with the wise proposal in the Heywood Bill (which has a clear precedent in the Padiham Act of last session) providing for the redemption of the perpetual gas annuities at the end of a period of years, instead of allowing them to hang as an eternal clog on the undertaking.

The Home Office and Dangerous Electricity.

After many months' repose, the proposed Home Office regulations in regard to the generation, transformation, distribution, and use of electricity in premises under the Factory and Workshop Act, 1901, have again come to the fore. The regulations, as originally drafted, caused a howl of indignation throughout the electricity supply industry; and the opponents came along in a perfect shoal protesting against what they all regarded as monstrous regulations as to the generation, supply, and use of electricity in places where workpeople careless or ignorant of the dangers of electricity are employed. The result was the appointment of Mr. James Swinburne, F.R.S., to conduct an inquiry, and report and make recommendations. The mass of evidence and argument that was put before him has been simmering for some months; and now the Commissioner has issued his report. There is a great deal of faith in, and respect for, Mr. Swinburne in the electrical industry; but it is not quite clear whether the regulations modified in the manner he proposes will be received with unanimity. Blessings, however, should be poured upon his head, but not prematurely, because (although his proposals have been referred to as though they represent finality in the matter) we take it that the Home Office will exercise discretion as to whether or not they accept them.

As a matter of fact, the bottom will be knocked out of the original scheme of regulations if the Commissioner's view is accepted, that the Home Office should relinquish their idea of applying the regulations to installations supplied with current at above 130 volts direct and 65 volts alternating, and revert to the Board of Trade limit of 250 volts for direct current, with 125 volts for alternating. There is no

question that, in connection with all legislatively protected supplies, the public should also be safeguarded; but the protection should be on rational lines, and not restricted to such fine limits that wider public interests are jeopardized in consequence. We have had enough tight-lacing applied to the gas industry, and know something of the evils. At the moment, however, the Home Office have to decide between the Commissioner and their Chief Electrical Inspector of Factories (Mr. G. Scott Ram), who holds, as readers are aware, very strong opinions on the subject of 250 volts direct and 125 volts alternating giving too great latitude where workpeople are employed. It was only the other day that, at an inquest, he stated that he knew of 22 cases of death due to electrical shock at 250 volts and less. Mr. Swinburne is equally aware of this. But these deaths he regards as being due to exceptional causes; and exceptional causes require exceptional treatment, which treatment should not be generally applied. His suggestion, however, largely saps the original intentions of the Home Office in making the move they did, after certifying in 1907 that the generation, distribution, and use of electrical energy in factories, workshops, &c., was "dangerous."

The Home Office have no doubt viewed, too, with somewhat mixed feelings, the idea of Mr. Swinburne that the department should have a little more responsibility on their own shoulders in such matters as determining what are dangerous conditions, instructing as to the modification of existing installations sufficient to render them safe though not complying to the full with the regulations, and in giving directions as to when an authorized or competent person shall not work alone. The Home Office did not bargain for quite so much responsibility; and they may decline to have it shifted upon them by the Commissioner. Among other points that will be remembered as having aroused terrible clamour, in this instance by the Power Companies, was the regulation prescribing a no-voltage release for motors rated at above ½-horse power. During the inquiry this was amended in manner allowing of one no-voltage release to protect a group of motors. The Commissioner evidently regards the provision as superfluous, and is quite content to have means at hand, in every place where machines are being driven by electric motors, for either switching off the motor or stopping the machines if necessary to prevent danger. The regulations as to the use of flexible wires for alternating currents or for pressures above 150 volts direct current have been strengthened, and efficient control prescribed. The provision as to the employment of competent men on electrical work has been enlarged in respect of its application; and where work requires technical knowledge in order to avoid danger, no man under 21 years of age is to undertake it, and the man who does so is not to go unaccompanied. These are a few of the prominent points that arrest attention in reading through the modifications of the regulations. Mr. Swinburne has, unquestionably, done his level-best to satisfy all the electrical interests; the interest that will be least pleased will be found at the Home Office.

Standardization of Refractory Materials.

Early last year, a movement was initiated by the English Ceramic Society for the holding of a conference of representatives of the various technical institutes and societies to consider the possibility of making arrangements for the grading and standardizing of refractory materials used in the construction of furnaces, kilns, ovens, &c. Impetus was given to the movement by the discussion which followed the reading of Mr. F. J. Bywater's interesting paper at the meeting of the Institution of Gas Engineers last June; and, as the result of the labours of Dr. J. W. Mellor, a meeting of representatives was held at Stoke-upon-Trent on the 4th inst., when a Committee was formed with the provisional title of "The Committee for the Standardization of Refractory Materials," and having Mr. J. E. Stead, F.R.S., as Chairman, and Dr. Mellor as General Secretary. Upon the Committee are Messrs. John Bond, F. W. Bywater, and Edward Jones, as representatives of the Institution of Gas Engineers. The outcome of the meeting will be found recorded in another part of the "JOURNAL." It may, however, be mentioned here that the general opinion was that there was need for the Committee; and a preliminary scheme was submitted, under which the members representing the various industries will formulate their particular demands by inviting expressions of views as to the materials at present in use, the conditions under which they are employed, and the possible improvement of their sizes, patterns, &c. The discussion on Mr. Bywater's paper brought into prominence the importance of this subject. The methods in vogue for the investigation of clays have so advanced that it can now be treated in a manner which would have been impossible five or six years ago; and it is to be hoped that all consumers of refractory materials will communicate their views on the matter to the Secretaries of the different institutes and societies represented on the Committee, or to the General Secretary direct, at the County Pottery Temporary Laboratory, Stoke-upon-Trent.

Gas Engineers and Company Promotions.

There is indignation up and down the country among gas engineers at the use made in the prospectus of the Beaufort Gas, Light, and Coke Company of the membership in the Institution of Gas Engineers of one of the Directors—Mr. S. J. Acland. The members of the Institution know sufficient of the character of the promotions with which No. 99, Cannon Street is identified to, generally speaking, desire to keep themselves, and their reputations, safe from the slur that participation cannot fail to bring. It is to the interest of the profession to do their utmost to ensure that there is purity and fair dealing in all transactions between the gas industry and the public, and to denounce anything that is otherwise; while it is also their business to see that the dignity of membership of the Institution is not made to serve the machinations of certain professional company promoters. Last week we suggested a few points on which the views of Mr. Acland and Mr. H. Russell, as gas engineers, and as Directors of the Beaufort Company, would be of the greatest interest; but as yet they have failed to give their professional fellows the benefit of those views, or tendered any justification for much of what appears in the prospectus and the letter signed by S. J. Acland, M.I.G.E., Consulting Gas Engineer.

The Story of the Amman Valley Company.

Mr. Russell is also identified with the Amman Valley Gas Company, in whose interests he has indulged in certain proceedings that brought him recently into conflict with the Ammanford District Council; and he is also named in the Bill promoted by the Amman Valley Company as a Director in association with Edmund Eaton and John MacLean. The promotion of the Bill and the opposition one by the Ammanford Company supplied, through the statements in the preambles, our readers with some interesting matter, in the issue of the "JOURNAL" for the 5th inst. (pp. 14, 21), regarding the scheming for extracting money from the public through gas undertakings of poor standing. The tale then told is amplified in a statement circulated by a Committee of Shareholders in the Amman Valley Company, two of whom—Messrs. S. Cocker and John Miller—are among the first Directors named in the Ammanford Bill, through and by which it is proposed to wipe out of existence the direction by Eaton and his associates of the Amman Valley Company. It will be seen how the Eaton promoters obtained the contract to put down works, through their Construction Company, at what we know from the forfeits offered in the Amman Valley Bill to have been scandalously exorbitant figures. According to the circular, too, the Water and Gas Debenture and Share Investment Trust—another piece of the machinery of Eaton and his colleagues—were appointed to issue the prospectus on the terms of cash expenses *plus* 10 per cent. of all money received by the Amman Valley Company on shares! This is why lists of shareholders in gas companies of good repute are wanted. The story published by the Committee also asserts that Eaton presided at all the early meetings of the Directors at which much of the money subscribed by the public passed easily to one or other of the concerns in which he is interested. It is a curious tale, and exhibits a pile of regret following an early display of confidence in these promoters by investors on nothing but specious and tempting statements in prospectuses, the value of which those who have parted with their money are now capable of estimating. It is mentioned in the circular of the Shareholders' Committee that proceedings are being taken against Eaton and others by a share and debenture holder for the recovery of his money, on the ground of misstatements in the prospectus. What with this action, the appeal pending over the question of the supply of shareholders' lists, the

parliamentary proceedings, the work attaching to their various promotions in the capacities of directors, builders, financiers, prospectus circulators, &c., and still continuing the business of developing fresh schemes for launching on the public, the active heads of affairs at No. 99, Cannon Street will be kept pretty busy the next few months.

The Encouragement of Thrift.

What is being done in the South Metropolitan and the South Suburban Gas Companies in the direction of encouraging thrift—reference is not now made to the co-partnership scheme strictly speaking—on the part of their employees is by this time pretty well known; and the story is told once again to-day in our news columns, where a report appears of evidence given by the late Sir George Livesey more than eighteen months ago before the Departmental Committee appointed to inquire into the operation of the Truck Acts, and to report whether any amendments or extensions of their provisions were desirable. There is no hesitation apparent in the verbatim report of this evidence as it is to be read in the Blue-Book. Far from it, Sir George was speaking about what he knew; and his manner of stating facts was on no occasion a half-hearted one. The Truck Acts were, of course, passed with the idea of providing remedies for undoubted abuses; but if the recommendations of the Committee were to be adopted in their entirety, the result might be—in fact, from what Sir George stated when before the Committee, there is no doubt that it would be—very detrimental to some schemes which have been arranged in the best interests of working men. There are three funds in operation in the South Metropolitan and South Suburban Companies—the sick and burial, superannuation, and accident funds; and Sir George said it seemed that almost the only practical way for collecting the subscriptions payable by the men (the Companies also contribute largely) was to deduct them from the wages, with the employees' authority and consent. In addition to this, there is a system by which men can request the pay clerk to stop any amount decided upon from their weekly wages; and such sums are placed to the men's credit—thus making the Companies a sort of savings bank. If Parliament declared all such deductions as these from wages illegal, Sir George thought the men would greatly regret it. In spite of this evidence, however, the majority of the Committee say that they heard nothing to convince them that these contributions could not be collected equally well without the power to deduct money from the workers' wages; and, with few exceptions, they recommend that such deductions should not be allowed. Two members of the Committee, however—Mr. Delevingne, of the Home Office, and Mr. Yarrow—it is worthy of remark, are of opinion that this view of the matter is "against the weight of the evidence." It is not within our scope to deal here with all the evidence given; but certainly the prohibition would be at variance with Sir George's testimony.

District Council Finances.

In many matters the Urban District Councils do things—as is only seeming—on a much more modest scale than their big brothers the Borough Councils; but nevertheless the figures relating to them which appear in another part of this issue show that their financial transactions are of very considerable magnitude. On previous occasions, one volume of the Annual Local Taxation Returns has sufficed to set forth the affairs of both borough (outside London) and urban district councils; but for 1905-6—the latest year the figures with regard to which have been published—there are two Blue-Books, one for the boroughs and the other for the districts. Both are on similar lines; but in the case of the district councils one misses that municipal trading tit-bit which has during the last two issues been a conspicuous feature in connection with the statistics compiled with regard to the borough councils—namely, the table showing the transfers that have been made in aid of rates out of profit from, and the transfers from the rates to make up deficiencies in revenue on account of, the "reproductive" undertakings. At March, 1906, there were 326 boroughs (exclusive of the Metropolis), while the number of urban district councils was 812; but whereas the rateable of the former was over £72,000,000, that of the latter was only £31,500,000. When we come to the total amount of loans outstanding, the difference is even more marked; for in the case of the borough councils the figure is over £240,000,000, and in that of the urban district councils it is no more than £34,500,000. Many of the items are the same in both instances; and of the sum owing by the urban district councils 24·5 per cent. is for purposes of sewerage and sewage disposal, 15·5 per cent. for water-works, 10·1 per cent. for gas-works, 10·3 per cent. for education, 8·2 per cent. for street improvements, 6·5 per cent. for electric lighting, and 4·7 per cent. for tramways and light railways. Altogether the loans outstanding in respect of undertakings which yield revenue and for works of private improvement (and which amount is recoverable) represent, in the case of the district councils, over 40 per cent. of the total debt. Of the receipts of these councils for the year 1905-6, the amount raised by means of public rates accounts for 55·1 per cent.; while the receipts from revenue producing undertakings and private improvements represent rather more than 23·6 per cent. of the total income. In considering the monetary aspect of local government affairs nowadays, sight must not be lost of the important part which education plays, as compared with what was the case some years ago. In 1905-6 the district councils had loans outstanding of £3,366,250 in respect of elementary education, whereas in 1902-3 there was a blank against this item. In this period, the total increase of loans has been some £6,500,000, which leaves roughly an addition of £3,000,000 to be accounted for in other directions than education. Nearly £1,000,000 of this has been on account of electric lighting; while tramways and light railways are responsible for practically an identical addition. Gas-works have only increased their outstanding loans in the same period by about £200,000, and water-works by £250,000. The average amount in the pound of the rates received by the district councils (other than for purposes of elementary education) still remains round about 3s. 3d.; but, in addition to this, elementary education is now responsible for rates of nearly another 1s. 3d. in the pound.

A Public Misstatement.

Some inconsiderate friend has sent Mr. Royston, the Chairman of the Highways Committee of the Finchley Borough Council, the leaderette that appeared, under the above heading in our issue for the 12th inst.; and he fully acknowledges that it is quite possible he did, though it was unintentional, omit the distinguishing word "electrical" when he attributed to the "Engineer of the City of London" the foolish statement that, "light for light, high-pressure gas cost four times as much as electric flame arc lighting." The omission makes all the difference between Mr. Frank Sumner, the City Engineer, and Mr. Voysey, the Electrical Engineer; and this shows how necessary it is for care to be exercised in their statements by men occupying public places. There is no reason to doubt Mr. Royston when he says he had no intention of misleading; so that this particular aspect of the matter may pass. Mr. Royston's statement was made at the last meeting of the Borough Council; and as we read what follows his admission as to the unintentional dropping of the term "electrical," it reminds of a phrase used by a public speaker the other day as to the puerilities of immature thought. Mr. Royston says our strongest criticism of his speech was the omission of the qualifying word "electrical," and if that was the strongest criticism that could be offered, then he could only come to the conclusion that his facts and figures and arguments were unanswerable. Mr. Royston might do us the favour of refreshing his memory as to the entire scope of our previous comment; and if he really desires discussion, he can have it by opening up with criticism of what is there stated. Looking at the figures he used previously, we fear that, when he employed them (if he will pardon the paraphrasing of his own eloquent words in referring to a printer's slip in deciphering the spelling of a name of a member of the Council), he "did not know what he was talking about." We will not descend to the vulgarity of suggesting that he was in "a mixed condition."

Calcutta Lighting Contract.—We learn that Mr. Alfred Mansfield, of the firm of Mansfield and Sons, Limited, of Liverpool, has been appointed to confer with the Corporation of Calcutta in reference to the lighting of the city—the position which Mr. J. G. Newbigging was unable to occupy, as explained in last week's issue of the "JOURNAL" (p. 190).

Society of Engineers.—The first ordinary meeting of the Society for the present year will be held next Monday, at the Royal United Service Institution, Whitehall. According to the notice issued by the Secretary (Mr. A. S. E. Ackermann), Mr. J. W. Wilson, the outgoing President, will present the premiums awarded for papers read during the past session; and his successor, Mr. E. J. Silcock, will deliver his Inaugural Address.

THE LIVESEY MEMORIAL FUND.

We have received from Mr. Walter T. Dunn, the following list of further contributions to the above-named fund:—

1909.		£	s.	d.
Jan. 18	Amounts already acknowledged . . .	2033	11	6
,, 19	Glenboig Union Fire Clay Company, Glasgow	5	5	0
	W. R. Herring, Edinburgh	10	10	0
,, 20	James Stott and Co., London	2	2	0
	Henry Vivian, M.P., London	0	10	6
,, 21	Alexander Allan, Scarborough. . . .	1	1	0
	Proprietors of "Gas World," London .	15	15	0
	Chas. Hunt, London	50	0	0
	Ogley Hay and Brownhills Gas Company	2	2	0
	Salisbury Gaslight and Coke Company.	5	5	0
	Fletcher W. Stevenson, Coventry . .	5	0	0
	Walker and Wallsend Union Company.	10	10	0
	George Winstanley, Kenilworth . . .	1	1	0
,, 22	J. H. Brearley, Longwood	5	5	0
	Brentford Gas Company.	105	0	0
	A. F. Browne, Vauxhall.	5	5	0
	E. Groschke, London.	10	10	0
	L. Monk, Hawick	1	1	0
,, 23	Frodsham Gas and Water Company .	5	5	0
	R. S. Gardiner, London.	21	0	0
	H. Kendrick, Stretford	2	2	0
	Scarborough Gas Company	10	10	0
	Torquay Gas Company	10	10	0
	City of Waterford Gas Company . . .	3	3	0
,, 25	Enfield Gas Company	26	5	0
	E. Körting, Berlin.	1	1	0
	Chas. W. Offord, Enfield	2	2	0
	Richard Pelton, Tunbridge Wells . .	1	1	0
	A. E. Podmore, London.	1	1	0
	Ross Gas Company	2	2	0
	Samuel While and Co., London . . .	2	2	0
	William G. Waller, Lower Sydenham .	0	10	6
	Total	£2358	8	6

Mr. Dunn asks that it may be mentioned that Mr. Arthur Griffith, the Secretary of the Society of British Gas Industries, has informed him that the members of his Society have arranged to subscribe collectively.

Yesterday, the following letter, referring to the fund, was received from Mr. Charles Carpenter, the Chairman of the South Metropolitan Gas Company:—

Sir,—I fear that some misapprehension exists with regard to the above, which I trust you will allow me the hospitality of your columns to remove.

It has been decided to erect a memorial to the late Chairman in the form of a bronze statue upon a granite plinth, which will be placed in the centre of the garden plot adjoining the offices. The preliminary sketches of the sculptor have been approved; and the order for the work—which will cost between £1150 and £1200—has been given. The cost is being borne wholly by the shareholders, officers, and workmen of the Company, and contributions from other sources have not been accepted.

Some have, however, been offered; but it has been suggested to the contributors that their donations should be transferred to the Leeds Professorship Fund, and this proposal has been accepted. I am sure this will not be looked upon as ungracious, if thought is given for a moment to the unique relationship which existed between Sir George Livesey and the South Metropolitan Company.

THE HOMELESS GAS-WORKERS OF MESSINA.

The President of the Institution of Gas Engineers (Mr. Thomas Glover, of Norwich) sends the following letter for publication in the "Journal," with an intimation that he has forwarded to Mr. Martin a cheque for two guineas to be added to the relief fund.

Sir,—With reference to the appeal made in the "Journal" of Jan. 19, may I draw the attention of your readers, and particularly of the members of the Institution of Gas Engineers, to the fund opened for the relief of those gas-works employees in Messina who survived the recent earthquake but with the loss of all their possessions.

Englishmen are not usually behind in putting their sympathy into practical shape; and those connected with gas-works in this country—either as officials or as workmen—will, I am sure, feel that the unfortunate gas-workers of Messina have a claim on their fraternal sympathy and help.

The gifts of the generous are sometimes withheld for lack of a reliable channel for the transmission of subscriptions, or because of uncertainty as to the wise and efficient administration of such funds as may be collected. In this case, no such doubts need exist, as the Secretary of the Continental Union Gas Company, Mr. W. Martin, No. 7, Drapers Gardens, London, has consented to receive subscriptions; and the administration will be in the hands of those who know each individual case of need.

The Position of the Fund to Date.

The above communication from the President of the Institution will, we feel sure, bring, in practical form, the expression of the sympathy of further readers with the distressed gas-workers of Messina, and their wives and families. The money, as we stated last week, is to be devoted to assist those who escaped the worst evil of the disaster to restore (we fear it can only be partially) the personal possessions wrecked and irretrievably lost in the catastrophe. Many of them, formerly with happy homes, are to-day homeless; and few there are who read these lines who can fully realize what that means.

The list of first subscribers to the fund was published last week. The additional contributions, which have raised the fund to about £250, are acknowledged to-day.

	£	s.	d.
Amount brought forward	£194	15	0
Office Staff Continental Union Gas Company, Limited (further subscriptions)	1	11	6
Mrs. A. L. Johnston	2	2	0
Mr. F. W. Himing	5	0	0
Staff Pont-à-Mousson (*per* Fenestre Cadisch and Co.)	8	12	11
Fenestre Cadisch and Co.	2	2	0
"Gas World"	3	0	0
Mr. H. R. Sibson	0	10	6
Mr. Joseph Cash	1	1	0
Mr. Thomas Glover	2	2	0
Mr. J. W. Helps	1	1	0
Messrs. S. Cutler and Sons	25	0	0
Mr. Walter King	2	2	0
	£248	19	11

THE GASLIGHT AND COKE COMPANY.

Half-Yearly Report.

The following is the report on the working of this Company during the six months ending Dec. 31, which, with the accounts (an abstract of which will be published next week), will be submitted to the proprietors on Friday, the 5th prox.

The accounts for the past half year show that, after providing for fixed charges and setting aside £10,000 for the half year towards the redemption fund (in accordance with the provisions of the Company's Act of 1903), there remains a balance of £354,687 5s. 7d. The amount brought forward from the previous half year being £412,298 6s. 1d., there is a total sum available for distribution of £766,985 11s. 8d., out of which the Directors recommend a dividend on the ordinary stock at the rate of £4 10s. 8d. per cent. per annum, which will absorb £343,661 13s. 9d., and leave the sum of £423,323 17s. 11d. to be carried forward to the credit of the current half year.

Notwithstanding the depression in trade and the exceptionally mild weather, the sales of gas during the half year have been maintained at practically the same figure as that in the corresponding half year of 1907. There has been an addition during the six months of 15,641 consumers; and an increase in the number of gas-stoves sold and let on hire of 21,723. In view of the general improvement in the Company's business, the Directors felt justified in announcing a reduction of 1d. per 1000 cubic feet in the price of gas from the 1st of January last.

The value of residual products still continues to be somewhat depressed—especially in the case of coke; and there is no prospect of immediate improvement.

A Bill in Parliament has been deposited to authorize the acquisition by this Company of the undertaking of the West Ham Gas Company and for other purposes. The clauses of the Bill will be explained to the proprietors when, in compliance with Standing Orders, it is submitted for their approval at an extraordinary meeting which will be held immediately after the close of the ordinary general meeting on the 5th prox.

The Directors have the pleasure to announce that they have decided to introduce a Co-Partnership Scheme for the benefit of the Company's employees. Their object in doing so is two-fold: First, to benefit the Company's employees, and, secondly, to encourage them to take a greater interest in the Company's affairs. It is hoped that the position of the Company generally will be thereby strengthened.

The Court of Directors has been furnished by the several Engineers of the Manufacturing and Distribution Departments, respectively, with the usual certificates that all the Company's plant has been maintained in thorough efficiency.

Horseferry Road, Westminster, S.W., Corbet Woodall, Governor.
Jan. 19, 1909.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 267.)

BUSINESS in most of the principal markets of the Stock Exchange last week was on a limited scale; and the general tendency, which at no time was over and above bright, became more and more dull towards the close. New issues, present and imminent, exercised a rather oppressive influence, and repressed activity in existent stocks. The opening had given promise of a better week, with investment in progress on a moderate scale in markets which showed a firm attitude generally. This tendency was pretty well maintained on Tuesday; but business was not lively. Wednesday showed irregularity in movement. Consols, which had hitherto held firm, began to droop; but Railways were in good odour. This feature continued on Thursday; the secured issues more especially being in demand. Consols, however, were weaker; and other lines were irregular. Friday fell very quiet, with a few variable movements here and there; but, as a rule, things generally were dull. Saturday was rather worse—Consols falling $\frac{3}{16}$; and the prevailing tendency being weak and languid. In the Money Market, there was at first a fairly good demand, and rates ruled firm; but later on the tendency fluctuated. Business in the Gas Market, which in the preceding week had a little fallen off, now more than recovered its previous activity, and, moreover, developed reinforced strength. The announcement that the Gaslight and Coke Company would maintain their last declared rate of dividend and carry forward a balance greater by £11,000, was received with satisfaction. The ordinary stock, which opened at 102, was actively dealt in, and rose to 103¾—an advance of 1 in the quotation. The secured issues were firm; the maximum realizing 89¾ and 90¼, the preference from 107¼ to 107½, and the debenture from 85 to 85¼. South Metropolitan was rather quiet and unchanged. Transactions ranged from 121½ to 122¾. The debenture was marked at 85. Commercials were quite inactive, with a couple of dealings in the 4 per cent. at 108, and one in the 3½ per cent. at 104. Among the Suburban and Provincial group, Brighton original changed hands at 216 (a rise of 1), British at 42⅞ and 43⅛, and West Ham at from 113¼ to 115¼ (a rise of 2). Liverpool "A" and "B" made some further smart advances, the latter coming close up to a 4 per cent. price. Chester and Ilford also improved. In the Continental companies there was very little doing. A few transactions were marked in Imperial at from 179 to 180½, and one in the debenture at 96. Union was done at 101 and 102, ditto preference at 138 (a rise of 2), European fully-paid at from 24 to 24½, and ditto part-paid at 17⅞ and 18 (a rise of ½ each). Among the undertakings of the remoter world, Buenos Ayres was done at from 11⅞ to 12, Monte Video at 11¾, Oriental at 141 and 141¾, Primitiva at from 6 to 6⅛, ditto preference at from 5 7/32 to 5⅜, ditto debenture at 96, and River Plate at from 13½ to 13 13/16.

ELECTRICITY SUPPLY MEMORANDA.

Lighting of Public Institutions—The Effect of Municipal Ownership in Narrowing the Views of Local Guardians and Councillors—Illustration from Canterbury—Loose and Unjust Assertion—An Oft-Startled Company.

AT the present time in various parts of the country where gas companies operate and municipal electric lighting undertakings are in opposition, the question of ousting gas and using electricity in illuminating the public buildings is being keenly discussed. Over the matter there is much talk of an incoherent and irresponsible character; and views of a singularly narrow order find public expression. As the result of discussion the past two or three years, electricity (not on the merits of the case) has, in some instances, come off victorious, while we can point to quite an equal number of cases where—the question having been treated on a proper business footing, and prejudice not being allowed to warp judgment—gas has asserted itself as the more economical and efficient illuminant. There is before us a report of a meeting of the Canterbury Board of Guardians, at which this matter came up in connection with the lighting of the workhouse; and we may extract points from the speeches to illustrate how the subject, to the disgrace of local government, is all too frequently dealt with. The discussion, it is freely admitted, was purely a preliminary one. But many of the statements made were, through ignorance or omission, far from being true; insufficient information was given; and much was publicly said that might be exceedingly detrimental to an undertaking that has for a great number of years served the city, and has paid into the city exchequer a large amount of money in rates. We do say that a spirit of fairness ought to animate men in public positions, and that before they give utterance to statements such as, for example, Mr. A. S. Paine made on this occasion, they should take the trouble to investigate the question from all sides.

The common and narrow view that is adopted by many men in public positions, in considering this question of the lighting of public institutions, was well exemplified by both Mr. Paine and Mr. Urry. The former gentleman stated that "the workhouse was an institution supported by the ratepayers; and the electric light station was also an institution supported by the ratepayers." Mr. Urry was of opinion that "all public institutions should be fitted up with the electric light, which belonged to the city." And in another place he said, "we have the electric light in the city, and we ought to support it." In our local public life, it is a pity there are so many men who forget that they are appointed to perform certain definite duties, and that these duties should be carried out without external considerations dominating, and without fear, prejudice, or favour. Mr. Paine and Mr. Urry were elected to the Canterbury Board of Guardians so as to direct the affairs of the workhouse and infirmary, and generally administer the poor law, without reference to any matter outside these duties. Because, however, the electricity station belongs to the city, they do not trouble—presumably thinking it is not part of their duty to do so—whether a certain proposal in regard to lighting is in the interests of the workhouse and infirmary, or whether economy and efficiency are on the side of gas or of electricity; they dogmatically assert that the latter should be adopted for lighting the institution. The electricity undertaking being a municipal concern, they say, in effect, "we, as guardians, should support it." We, on our part, accuse them, while they bind themselves to such a narrow view of their guardian duties, of betraying the administrative trust reposed in them by the ratepayers. The workhouse, says Mr. Paine, is an institution supported by the ratepayers; and the electric light works is an institution supported by the ratepayers. Now it is Mr. Paine's plain duty, as a guardian, all disinterested people will agree, to give these two statements absolutely independent consideration. "The workhouse is an institution supported by the ratepayers." Therefore the guardians should administer the affairs of the workhouse in the interests of the ratepayers without fear or favour, and make it, as an independent institution, an object-lesson in economy and efficiency. "The electric light is an institution also supported by the ratepayers." What has that to do with the guardians? They have merely to buy in the cheapest market, and patronize, as a business principle, the cheapest and most efficient illuminant—no matter whether it be incandescent gas-light or electric light.

It is a common mistake that is made in saying that, because the electricity undertaking is a municipal possession, it is supported by the ratepayers. It is a point worth examining. The compulsory support of the ratepayers, as a body, only comes in when there are deficits, or through exorbitant prices for the street lighting or public institution service. If it so happens that the municipality have unhappily come into possession of an undertaking that produces a commodity that is less economical and less efficient than the commodity supplied by private enterprise, is the municipal product to be thrust down the throats of the ratepayers if they do not want it? Mr. Paine and Mr. Urry say "Yes." The majority of the ratepayers of Canterbury do not want electricity privately; and why should it be foisted upon them through the public institutions or the streets, if there is not some resulting economy and greater efficiency? Comparing the relative merits and demerits of gas and electricity, a majority of the ratepayers of Canterbury give support not to the municipal electric light, but to gas; and we want to know why the majority who consume gas should be injured by the taking away of the custom of the workhouse and infirmary from the Gas Company, unless it can be shown beyond question that some material benefit is to accrue to them as ratepayers through the change? It is to the interest of the Gas Company to supply the ratepayers as cheaply as possible; and we undertake to say, too, that the Company pay more, in the shape of rates, towards the upkeep of the city than the municipal electric light concern. The Company also employ more labour, and pay more in wages. Therefore we ask which gives the greater support to the city—gas or electricity? There are a few mistaken notions existing in the brains of some of our local rulers; and the compulsory support by the ratepayers of the municipal electricity supply is one of them.

There is another point which shows the narrow spirit in which this question is dealt with, and it has also illustration in the proceedings at the meeting of the Canterbury Board of Guardians. It was moved by Mr. Paine that a "Committee of the Whole House" should consider the question of a change in the lighting from gas to electricity, and that the manager of the electric light works should be asked to attend to answer questions; but there was no suggestion on the part of the mover that a representative of the Gas Company should likewise be invited to be present for the same purpose. Is this the way Boards of Guardians steer an independent and unbiassed course in the management of the affairs entrusted to them by the ratepayers? Let us see what happened. Mr. Chapman (who tries to perform his duties of guardian under the stigma of being a shareholder in the Gas Company) humbly suggested that the Company should be invited to be represented, when Mr. Urry—not with the courtesy due from one member of a public Board to another—accused him of raising all the obstacles he could in order that the question might not have fair consideration. Fair consideration can only possibly be given by the Gas Company being represented. The Chairman gave his casting vote in opposition to "fair" consideration.

From some of the statements made at the meeting (which are typical of those often heard at meetings of guardians, and other bodies having charge of public institutions in areas supplied by a municipal electricity undertaking), it is quite evident that certain of the guardians are in need of some expert advice from the gas point of view, as well as from the electrical. Mr. Paine assured the meeting that there had been several complaints about the gas lately at the workhouse; and, as the result of visits that Mr. Urry and he had made, they found that the gas was really

inefficient. That is a positive statement, and one that without explanation is calculated to do injury to the Gas Company. Mr. Paine did not explain why the gas, which it is the duty of the Corporation to see is up to the parliamentary standard (the ratepayers have no such corresponding protection in regard to electric voltages, &c.), is inefficient. Being up to the parliamentary standard, why is it inefficient? We suggest that the workhouse burners, and not the gas, are inefficient; and that, for a comparatively small expense, this condition of things can be rectified. If we are not mistaken, the Canterbury Guardians are so behind the times that the workhouse is still lighted by those wasteful antiquities, flat-flame burners. The place is piped for gas; and the fittings can be easily and economically converted to the incandescent system. Among the loose statements made public was that an "expert" had informed Mr. Paine that the infirmary could be wired for from £30 to £40; and the latter gentleman suggested that the whole workhouse could be wired for between £80 and £100. Such statements from a public man are absurd. It is proposed, we believe, to adopt electric metallic filament lamps. Does Mr. Paine know that at every point at which there is a so-called 50-candle power (really a 45 British standard candle) lamp, the cost of the lamp alone, without any fitting or wiring, will be 4s. 9d.; and this expense will have to be incurred throughout the place, on an average about every 700 hours of use?

Another loose statement was that gas is costing the institution £220 a year; and the very generous estimate is made that (saying nothing, of course, as to the initial expense of wiring and costly renewals) a saving of £120 a year will be effected by adopting electric lighting in the building. We will say nothing more upon this ridiculous estimate. Criticism can be deferred to the time when (if they make the change to electricity) the guardians have before them a full year's account. But as to the £220 cost of gas, Mr. Paine, when making the comparison—if the report before us gives a fair account of his speech—either deliberately or through oversight (which was it?), did not mention that gas, in addition to being (if we construe rightly remarks in other speeches) used in flat-flame burners, is employed also for other purposes by the nurses, is consumed for cooking, also in cold weather for keeping pipes from freezing and to warm the atmosphere, and the master's office is fitted with a gas-fire. We do protest strongly against—solely through municipal ownership—unfair comparisons being made in public in the manner described. In Canterbury as in other places, it is a slander upon the gas business to have such statements published, as those to which attention is here directed, without full explanation. It is injurious to a Company performing, under Act of Parliament, a public service. There ought to be a sense of greater responsibility and honour among local public men; and above all things they should be just. Another speaker at the meeting declared that there was much danger with gas through the throwing about of matches. Matches are not intended to be thrown about; and any official or servant in a workhouse or infirmary caught doing such a thing should be promptly discharged. We do not remember that the "danger" has had any serious consequences up to the present at the Canterbury Workhouse. Perhaps the speaker has never heard of the insidious character of electricity—of short-circuits and mischief occurring without the slightest warning; and of the valuable buildings that have perished through so small a cause. We have dealt with Canterbury as being typical of what has occurred in other towns; but, at the same time, there will not be any objection to giving, if they so desire, both Mr. Paine and Mr. Urry an opportunity in our columns of criticizing these comments—providing they have no objection to a right of reply on our part.

It is a pleasure to see that the City Electric Lighting Company are doing the high-pressure inverted gas-lamps in Fleet Street the honour of taking them seriously. Only the other week, in a leaderette, attention was called to the fact that anyone desirous of making a contrast of one of the new lights with antiquated electric arc lamps and flame arc lights could do so at Ludgate Circus; but the opportunity has been curtailed by the City of London Company, who have removed the three arc lamps of a remote period, and put in their places flame arc lamps. We are not at all sorry, because it affords an excellent demonstration of the best that they can do in comparison with the high-pressure inverted gas-lamps; and that best is not in favour, in the comparison, of electricity. It will be noticed by those interested in making an inspection that there are three flame arc lamps here against one inverted gas-lamp, and a further cluster of flame arcs illuminate the front of the "King Lud." Incidentally, it is also interesting to observe how well the City of London Electricity Company play the part of startled children. When the high-pressure gas-lamps of the old type went up by the Mansion House and in front of the Stock Exchange, flame arcs were promptly hoisted in proximity. When Queen Victoria Street was lighted by the high-pressure gas system (also of the old type of lamp), up went flame arcs at Blackfriars Bridge approach. Then there was no rest, too, until the Corporation allowed the Company to string flame arcs across Cannon Street. Now there are these three flame arcs at Ludgate Circus, trying to remove some of the glamour of one of the latest type of high-pressure lamp. It is instructive as to the effect gas has on the Company; and it is likewise humorous.

Mr. Isaac Williams, the Chairman of the Skipton Water Company, and formerly a member of the Urban District Council, left £3136.

LOCAL INCOME AND EXPENDITURE.

Finances of Urban District Councils.

By way of resuming consideration of the financial transactions of local governing bodies, some figures may be taken from Part VI. of the Annual Local Taxation Returns, which refers to the accounts of Urban District Councils, other than Town Councils. Similar particulars with regard to the business of the Borough Councils were, it may be pointed out, given in the "JOURNAL" a fortnight ago. All the statistics are in respect of the year ending March 31, 1906, which is the period covered by the Blue-Book.

The number of urban district councils in England and Wales, for districts other than boroughs, dealt with in the report is 812. This shows a decrease of six compared with the previous year—the difference being accounted for by incorporations, amalgamations, &c. Of course, the financial transactions of the district councils resemble in many respects those of the borough councils, though naturally they are, speaking in a general sense, on a smaller scale. As is the case with the borough councils, a considerable portion of the transactions recorded relates to water, gas, electric lighting, market, and tramway and light railway undertakings, which are revenue yielding concerns. It is pointed out in the returns that the total receipts from these undertakings was sufficient to cover 93 per cent. of the expenditure on them, including charges in respect of loans. This is a statement of which the partizans of municipal trading are quite welcome to make the most they can. Then there have to be considered the extensive works of private improvement which are carried out, and the cost of which is recovered from the owners or occupiers of property. And in addition, there are many items such as sewage farms, cemeteries, baths, &c., while no less than 56 of the councils acted as local elementary education authorities.

The receipts of the urban district councils, excluding receipts from loans, amounted during the year 1905-6 to £10,447,232, including £1,431,851 on account of elementary education. The total receipts of the councils for the preceding year were £10,476,116. These receipts included sums received from county councils under the provisions of the Local Government Act, 1888, and also grants under the Agricultural Rates Act, 1896. The latter Act, however, does not apply to general district rates, which, in the case of the urban district councils, produced 85·5 per cent. (£4,926,947) of the total raised by rates (£5,759,996), so that the amount of the grants is small in comparison with that of the total income from rates. Among the other receipts were: Gas-works, £871,891 (as against £843,024 in the preceding year); water-works, £650,567 (against £794,092); electric light undertakings, £241,371 (against £216,927); and tramways and light railways, £153,110 (against £142,413). In comparing the two years, however, it must be kept in mind that the figures do not refer entirely to the same undertakings, inasmuch as some new councils have been added to the list and, as already remarked, others have from various causes been removed from it. In fact, in the year now being dealt with the changes were especially important; some of the districts taken out of the category on this occasion having been largely populated places. So far as the compilers of the Blue-Book found it possible to ascertain from the returns supplied, the receipts in respect of gas-works included £641,586 from gas-rentals, and £187,281 from the sale of residual products. The receipts in respect of water-works included £458,751 from water rates, rents, or charges for domestic purposes within the respective districts of the councils owning the water-works. It will be seen that the total receipts from water-works in the year now under review are given as £143,525 less than those for the preceding twelve months; but this difference is more than accounted for by the fact that in the returns for 1904-5 there were included two sums of £72,830 and £79,150 received by the Urban District Councils of Enfield and Tottenham for the transfer of their undertakings to the Metropolitan Water Board. The amount received during the year 1905-6 by means of public rates accounts for 55·1 per cent. of the total receipts; while those from reproductive undertakings (together with those in respect of private improvement works) represent rather more than 23·6 per cent.

The total expenditure of the councils in the twelve months, excluding that defrayed out of loans, was £10,503,244, as compared with £10,361,206 in the preceding year. There was thus an increase in the outlay of something like £142,000. Over £50,000 more appears under the head of elementary education; while loan charges were about £155,000 heavier. Among the items of expenditure may be mentioned the following: £1,673,199 on public roads and streets (as against £1,720,541 the previous year); £1,342,848 on education (against £1,284,875); £574,823 (against £568,723) on gas-works; £469,153 on public lighting, including £86,038 in connection with public electric lighting by the councils (against £477,756); £446,913 on sewerage and sewage disposal (against £470,654); £371,628 on water-works (against £375,476); £103,540 on tramways and light railways (against £131,846); £118,698 on electric lighting, not being public electric lighting (against £102,687); and £2,825,435 on repayment of principal (otherwise than out of sinking funds or redemption funds), payments to sinking funds, and interest on loans (against £2,670,245). Of the principal and interest so repaid, and allocations to sinking funds, £237,909 was on account of gas-works, £421,657 of water-works, £145,026 of electric lighting, and £87,224 of tramways and

light railways. The aggregate length of roads maintained and repaired by the councils at the commencement of the year 1905-6 was 2376 miles; and the outlay under this head amounted during the year to £466,381, which was at the rate of £196 per mile. The total length of roads other than main roads maintained by the councils was 11,374 miles; the expenditure being £881,966, or an average cost of £77 10s. per mile.

The expenditure by the district councils out of loans (including certain sums spent in anticipation of loans) during the year 1905-6 amounted to £3,096,101. Of this, £113,018 was on gas-works, £310,303 on water-works, £309,344 on electric lighting, £406,469 on tramways and light railways, and £552,449 on sewerage and sewage disposal works. The total expenditure out of loans during the year was less than that of the preceding twelve months by £862,491. Large decreases appear in the expenditure on account of gas-works, electric lighting, tramways and light railways, and sewerage and sewage disposal works. The amount under water-works is also somewhat less on the present occasion. The total amount of the loans raised was £3,268,314, including the following amounts: Gas-works, £114,739; water-works, £408,156; electric lighting, £363,805; tramways and light railways, £351,043; and sewerage and sewage disposal works, £558,197. The amount of loans raised in the twelve months was less by £660,823 than that raised in the previous year. The loans for gas-works, electric lighting, tramways and light railways, and sewerage and sewage disposal works, showed a large decrease; but under water-works there is an increase.

The amount actually repaid during the year in respect of loans (including payments out of sinking and redemption funds, but excluding unexpended balances of loans applied to the repayment of principal) was £1,641,206. The outstanding loans at March 31, 1906, amounted to £34,472,307. Of this debt, £8,435,097, or 24·5 per cent., was for purposes of sewerage and sewage disposal works; £5,356,642, or 15·5 per cent., for water-works; £3,479,882, or 10·1 per cent., for gas-works; £3,538,878, or 10·3 per cent., for education; £2,835,309, or 8·2 per cent., for street improvements; £2,243,624, or 6·5 per cent., for electric lighting; and £1,635,835, or 4·7 per cent., for tramways and light railways. The loans outstanding in respect of what are termed the "reproductive" undertakings and for works of private improvement represent, it is pointed out, a large proportion of the outstanding debt; the aggregate for water-works, gas-works, electric lighting, tramways and light railways, markets, and works of private improvement being no less than £13,844,270, or 40·2 per cent. of the total debt. The loans outstanding during the year under review increased by £820,706; the largest increases being for electric lighting, education, and tramways and light railways. The amount remaining at the end of the twelve months in sinking and redemption funds for meeting loans that are repayable in this way was £560,189. The sum paid to the funds during the year named was £203,202; and the amount taken out of them and applied to the repayment of principal was £151,913.

According to the last census (which took place in 1901), and bringing into account the alterations of area since that time, the total population of the 812 urban districts other than boroughs was 6,910,834, including 118,975 in respect of the districts which were added to, or became, boroughs during 1905-6. The total assesssable value of these districts for the purposes of the general district rates, or other rates out of which the general expenses of the district councils were defrayed, was £31,574,494, including £674,081 in respect of the districts which were added to, or became, boroughs during the year in question. The rates raised by the councils, other than for purposes of elementary education, amounted to £5,082,506, and were equivalent to 3s. 2·63d. in the pound on the total assessable value of the districts for the purposes of such rates. This figure compares with 3s. 3·25d. in 1904-5. The total amount raised by the councils by means of rates during the year for purposes of elementary education, amounted to £677,490, or 1s. 2·73d. in the pound calculated on the assessable value for the purposes of the poor rate of the districts in which the amount was raised.

There are accompanying the returns some comparative tables which show that the receipts of urban district councils from all sources except elementary education, but excluding the receipts from loans, increased from £7,752,163 in 1901-2 to £9,696,008 in 1905-6. The receipts for elementary education have in the same period gone up from £579 to £751,224. The total expenditure not defrayed out of loans, for purposes other than elementary education, increased in the five years from £7,736,712 to £9,258,866. The expenditure on elementary education in this period grew from £12,488 to £1,244,378. The receipts from public rates for purposes other than elementary education (including grants under the Agricultural Rates Act, 1896), which amounted to £4,624,238 in 1901-2, rose in 1905-6 to £5,086,595. It is remarked that the receipts from the most important undertakings which yield revenue —gas-works, water-works, electric lighting, tramways and light railways, and markets—show large increases during the last four years; while the annual expenditure in connection with some of the concerns has also grown considerably. The report states that in recent years there has been a distinct slackening in the rate of increase of the debt of the urban district councils. The outstanding loans at the end of the year 1899-1900 amounted to £21,013,554; at the end of 1902-3, to £28,013,075; and at the end of 1905-6, to £31,106,057 (excluding elementary education, which was a new item). Thus it is seen that the total debt of the councils rose in the four years ended March 31, 1903, by £6,999,521, or 33 per cent.; whereas in the four years ended March 31, 1906, it rose by only £3,092,982, or 11 per cent. In the five years to 1905-6, there has been a rapidly and continuous increase in the amount of outstanding loans for electric lighting and tramways and light railways. In the period between March 31, 1902, and March 31, 1906, the outstanding loans for electric lighting have increased from £1,112,049 to £2,243,624; while those for gas-works have remained practically stationary—the figures being £3,277,803 and £3,479,882 respectively.

GAS BILLS FOR 1909.

FOURTH ARTICLE.

THE Bills that have been promoted by Local Authorities and which deal, in the whole or in part, with gas supply are reviewed this week.

In the General Bill deposited by the Bradford Corporation, it was proposed, *inter alia*, to further consolidate the gas supply of the city by absorbing the Pudsey Gas Company and the Drighlington and Gildersome Gaslight Company, considerable portions of whose limits of supply are now included in the city. Authority was therefore sought to purchase the undertakings, and to merge them in that of the Municipality. An agreement had also been entered into between the Corporation and the Trustees of the late Sir Henry William Ripley for the purchase of the Ludlam Street Gas-Works in the city at the price of £15,000; and confirmation was asked to the agreement. We need not deal more fully with the proposals, as the ratepayers have vetoed the whole measure. [*Parliamentary Agents: Messrs. Dyson and Co.*]

In a voluminous Bill comprising, with the schedules, 208 pages, the Bury Corporation have a section devoted to gas. Full provisions appear relating to the making and maintenance of a railway between the Lancashire and Yorkshire Railway and the gas-works, and to the motive power to be employed for traction purposes. The limits of gas supply are re-defined by the Bill. The prescribed illuminating power of the gas to be supplied is put at 12 candles, as tested by the "Metropolitan" No. 2 burner, with Harcourt's 10-candle pentane lamp as the standard of light. The price of gas it is proposed shall not exceed 5s. per 1000 cubic feet. Respecting supply by prepayment meter—

In the case of any consumer of gas by means of a slot meter in which, upon inspection of such meter by the collector of the Corporation, the amount due in respect of the gas shown by such meter to have been so consumed shall not be found in the box attached to the meter for the purpose, the consumer shall be deemed not to have paid, and shall be liable to, and shall pay the same to, the Corporation.

In the financial section of the Bill, it is seen that all principal moneys are to be charged indifferently upon all lands and estates, the gas and other undertakings of the Corporation, and upon all the revenues of the Corporation, and so on. The Corporation are, however, to keep their accounts so as to show, under a separate heading, all the receipts and expenditure of the gas, tramways, electricity, and markets undertakings, for each of which there is also provision for reserve funds. The Corporation also desire power to establish a fire insurance fund for the buildings in their custody. When the fund equals £50,000, the Corporation ask for discretionary power as to discontinuance. An accident fund is also desired; but it is at no time to exceed £10,000. [*Parliamentary Agents: Messrs. Lewin, Gregory, and Anderson.*]

From the preamble of the Bill of the Conway Corporation, it is seen that they have borrowed for the purposes of their gas undertaking £23,575, and now owe £14,856. The chief purpose of the measure, however, is to provide for the extension of the limits of supply to Llangystenin and Llechwedd, in the county of Carnarvon. The Parish Council of Llangystenin and the Conway Rural District Council have given their approval to the proposal. For these extensions and for the improvement of their gas-works, the promoters desire authority to borrow £5000, and for the provision of gas stoves and meters £2500, and also such other sums as the Local Government Board may sanction. For the £5000, it is requested that repayment may extend over thirty years from the date of borrowing, and in respect of the £2500 over fifteen years. In connection with road works, protection is to be given to the County Council and London and North-Western Railway Company. [*Parliamentary Agent: Mr. A. Rhys Roberts.*]

Here is a Purchase Bill; the promoters being the Fermoy District Council, and the owners of the gas undertaking the Fermoy Gas Company, Limited. The Council believe that "it is expedient, for the purpose of providing a more efficient and economical supply, that the gas supply of the district should be in their hands." The limits of supply are defined; and then provision is made for the sale and purchase of the undertaking on terms to be agreed between the parties or settled by arbitration. In the latter event, the arbitrator, it is proposed, shall, in assessing the price or consideration to be paid to the Company under the provisions of this section, "have regard to the price at which gas would have in the future to be sold by the Company, in order to retain or secure consumers against the risk of possible competition by any other company or undertaker supplying gas, or any other agency for lighting, motive power, or other purposes." All the common provisions in the case of a purchase and transfer of this kind are embodied in the Bill. In connection with the supply of fittings, it is to be enacted that the expenditure of money in this

way shall only be through contractors; and all expenditure and financial obligations in respect to the fittings business are to be met by the proper adjustment of the charges. Separate accounts are to be kept, in order that it may be seen that this is done. The limit of price to be charged for gas is placed at 5s. for 14-candle gas, tested by the "Metropolitan" No. 2 burner, with the Harcourt 10-candle pentane lamp as the standard of light. The Council request power to borrow the necessary amount for the purchase; with forty years as the period for repayment. For other moneys required (except that necessary to pay the costs of obtaining the Act), they propose to go to the Local Government Board. [*Parliamentary Agents: Messrs. Lees and Co.*].

In the omnibus Bill now in hand, the Heywood Corporation desire further powers in connection with the gas undertaking. In the prepayment meter clause, the ordinary maximum 10d. and 1s. excess charges are mentioned, and in conjunction therewith appears the provision "that in any case where the maximum charge as aforesaid shall not exceed an amount equal to a rate of 10 per cent. on the cost of the meter, the Corporation shall be entitled, if they think fit, to make a minimum charge not exceeding that amount." The standard illuminating power of the gas to be supplied is placed at 14 candles, testing by the "Metropolitan" No. 2 burner and the Harcourt 10-candle pentane lamp. To business with consumers having a separate supply of gas or electricity, it is proposed to attach the following conditions:—

Notwithstanding anything contained in the Gas-Works Clauses Act, 1871, or any other Act, a person shall not be entitled to demand from the Corporation a supply, or the continuance of a supply, of gas for premises having a separate supply (that is to say, a supply from an installation other than that of the Corporation) unless he shall have previously agreed to pay to the Corporation such minimum annual sum as will give to them a reasonable return on the capital expenditure and standing charges incurred by them to meet the possible maximum demand for those premises, and the minimum annual sum to be so paid shall be determined in default of agreement by a petty sessional court. Where any person has a supply of gas laid on by the Corporation to any premises for which he has at the same time a supply of electricity either from the Corporation or from his own installation or that of any other person, the Corporation shall, in respect of the supply of gas so laid on, be entitled to receive such minimum charge as shall be fixed by them for each quarter of a year notwithstanding that the ordinary charge for the gas actually consumed in such quarter would amount to a lower sum.

In connection with the gas undertaking, it is in contemplation to borrow £10,000, with the period of repayment extending over 45 years. A matter already noticed in our columns concerns the gas annuities. The consideration paid by the predecessors of the Corporation for the acquisition of their gas undertaking consisted of perpetual annuities; and it is now thought expedient that these should be made redeemable at the end of a period of years. Provision for this (see text of clause in "JOURNAL," for Dec. 22, p. 841) is made in the Bill; and notice of the provision has been duly given to each holder of such annuities. A clause is inserted empowering the Corporation to appoint from time to time one or more persons, members of the Institute of Chartered Accountants or of the Incorporated Society of Accountants and Auditors, to audit the borough accounts, in addition to the auditors under the Municipal Corporations Act, 1882. [*Parliamentary Agents: Messrs. Baker & Co.*]

The Lisburn District Council are also of opinion that it is expedient, for the purpose of providing a more efficient and economical service, that the gas supply should be transferred to them from the Lisburn Gas Company, Limited. After specification of the limits of supply, clauses appear relating to the sale and purchase of the undertaking either by agreement or by arbitration. The ordinary provisions incidental to the transfer and to the future conduct of the undertaking by the Council are included in the measure. In connection with the supply of fittings, the charges are to be so ordered that they meet all financial obligations appertaining to the business. The price for gas of a standard illuminating power of 14 candles, it is contemplated, shall not exceed 4s. The testing for illuminating power is to be on the modern lines. As to finances, the promoters ask for power to borrow the necessary sum for the purchase of the works, for the improvement and extension of the gas undertaking not exceeding £20,000, and for working capital not exceeding £2000. For the first two purposes, a period of forty years from dates of borrowing is desired for repayment; and for the working capital, ten years. [*Parliamentary Agents: Messrs. Lees & Co.*]

A section relating to gas is included in the Mountain Ash District Council Bill. The ordinary prepayment meter clause is inserted with the variation (from the 10 per cent. on cost or 6d. per 1000 cubic feet), for meters without fittings, to 8d. excess per 1000 cubic feet, "provided that in any case where the amount to be paid by the consumer shall not exceed an amount equal to a rate of 10 per cent. on the cost of the meter, the Council shall be entitled, if they think fit, to make a minimum charge not exceeding the last-mentioned amount. The question of supply to premises having an independent service comes up again here, in a clause proposing that persons having a separate or private installation shall not be entitled to demand a supply without having previously agreed to pay the Council such minimum annual sum as will give them a reasonable return on the capital expenditure and standing charges incurred by them to meet the possible maximum demand for the premises, and the minimum annual sum to be so paid shall be determined, in default of agreement, by arbitration in manner provided by the Arbitration Act, 1889. The definition of the word "street" in section 3 of the Gas-Works Clauses Act, 1847, is to be extended (the same with water and electricity supply) so as to include any public footpath within the limits of the supply of gas. [*Parliamentary Agents: Messrs. Baker and Co.*]

(To be continued.)

STANDARDIZATION OF REFRACTORY MATERIALS.

A MOVEMENT has been set on foot by the English Ceramic Society for a conference of representatives of the various Technical Institutes and societies to consider ways and means of arranging for the grading and standardizing, as far as possible, of the refractory materials, such as fire-clay, magnesite, &c., used in the construction of furnaces, kilns, and ovens. The movement started in January, 1908, with the Society, and it received some impetus by the discussion which followed the reading of Mr. Bywater's paper on "Refractory Material" at the meeting of the Institution of Gas Engineers last year (see "JOURNAL" for June 23, p. 831). Dr. J. W. Mellor, who, it may be remembered, took a prominent part in the discussion, and wrote for the "Pottery Gazette" an article on the subject, which was reproduced in our columns, communicated with the Secretaries of the different Institutes, and representatives were appointed to meet at Stoke-on-Trent on the 4th inst. Among those present at the meeting were Mr. J. Bond, of Southport, Mr. Bywater, and Mr. E. Jones, of Burslem, representing the Institution; Mr. C. W. Thomas (Messrs. E. J. & J. Pearson, Limited, of Stourbridge) and Mr. J. Morton (Messrs. James Morton, Limited, of Halifax), for the fire-brick manufacturers; and Dr. Mellor, Mr. Bernard Moore, and Mr. E. P. Page for the Ceramic Society. The title of the new body was provisionally fixed as "The Committee for the Standardization of Refractory Materials;" and the following officers were elected: Chairman, Mr. J. E. Stead, F.R.S.; Vice-Chairman, Mr. J. H. Darby; Hon. General Secretary, Dr. J. W. Mellor.

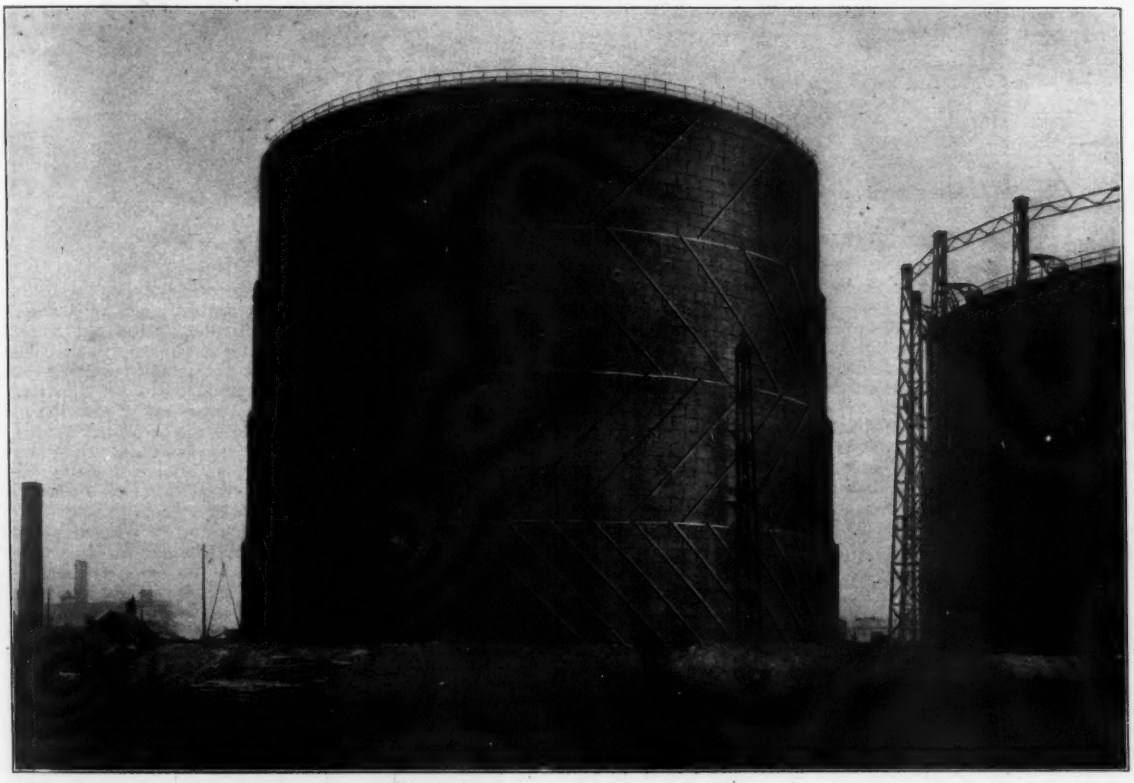
The general opinion of the representatives present was that there was need for such a Committee, and that the following preliminary scheme should be adopted: (*a*) To arrange and classify the various refractory materials, clay, siliceous, as silica and gannister; special, as magnesite, chromite, &c. (*b*) To arrange standard specifications for the raw materials and for the manufactured products. (*c*) To consider the possibility of arranging for uniformity in certain "stock" or "standard" sizes. (*d*) To arrange standard methods of testing, analysis, &c. To carry out this scheme, it was agreed that the representatives of the Institutes should consult with their respective fellow-members, and, wherever possible, procure information bearing on their specific requirements, together with data as to furnace temperatures and conditions of operation. All sections will, at first, conduct their own part of the inquiry independently of the others, and prepare drafts of their suggestions to be submitted to the next meeting of the General Committee. These suggestions will be embodied in a provisional report to be sent back to the sections for approval or amendment, and finally published as the general report. It is proposed to revise this report periodically, to keep abreast of developments. Since the expenses will not be very considerable, it was agreed that contributions from the Institutes and manufacturers would cover the preliminary expenses connected with the Committee's work.

There will be industrial and manufacturers' sections, and one representing the English Ceramic Society. The industrial sections include a chemical and electrical section, a glass section, a metallurgical section (representing the Iron and Steel Institute and the Institute of Metals), a gas engineers' section, and a pottery section. It is suggested that members of the Committee representing the various industries should formulate the demands of their own industry. This will probably be best done by inviting opinions on the following lines: (1) Materials at present in use, any general information, as analyses, &c.; (2) conditions of use, nature of furnace operations, temperature, and whether the temperature is continuous or intermittent; (3) criticism of materials at present in use; and (4) suggestions as to improvement, both in material and in sizes and patterns available. The Ceramic Society section will deal with (1) the definition of refractoriness; (2) the grades of materials, based on (*a*) refractoriness, (*b*) class of material, aluminous, as clay and bauxite; siliceous, as gannister and silica; special, as magnesite, &c.; (3) the examination of raw materials, chemical analysis, standard methods, method of determining refractoriness, mechanical analysis, and behaviour at various temperatures, shrinkage, porosity, and plasticity. The manufacturers' section will submit suggestions as to the elimination of odd and little-used sizes and shapes, standard sizes and shapes, deviation from specified dimensions in special sizes, and as to the grading of clays as proposed by the Ceramic Society.

The Annual Meeting of the Institution of Gas Engineers.—We are asked by the Secretary, Mr. Walter T. Dunn, to announce that the Council have arranged for the annual meeting of the Institution this year to commence on Tuesday, the 15th of June. It will be held, under the presidency of Mr. Thomas Glover, of Norwich, at the Institution of Mechanical Engineers, Storey's Gate, Westminster, by permission of the Council of that body.

A THREE-AND-A-HALF MILLION SPIRAL-GUIDED HOLDER AT NEWCASTLE-ON-TYNE.

Is there any limit to the application of the spiral system of guiding gasholders—that is to say, a limit to the capacity of the holders (within the bounds of experience with columned ones) which can be safely guided on that principle? The question is not one to be answered in any off-hand manner; but even with premeditation, the replies of engineers would, we venture to say, be somewhat diverse. This can, however, to-day be said definitely, that every step forward in the application of the system to larger storage capacities has not in any way diverted from the one straight line the excellent testimony that the system has rendered in regard to itself from the very stage of practical inception. Experience was at first obtained with holders having a storage capacity measured in thousands. Then progress advanced the experience to a million capacity (with four lifts in a circumscribed space) at Widnes, and to 1¼ millions at Longport. And in regard to smooth, frictionless running, with stability in all circumstances of the elemental stresses of winter, the holders of various capacities, diameters, and heights have put fears to rout, and have established a vastly increased, and still growing, confidence in them in the gas profession. But in capacity, what has been done before has been completely transcended by the new gasholder on the system which, by the courtesy of Mr. W. Doig Gibb, the Chief Engineer of the Newcastle and Gateshead Gas Company, we were privileged to inspect last week at the Company's Redheugh works. One-and-a-half million was, prior to November last, the capacity of the largest spiral-guided holder—though there are some 300 standing in various parts of the world. But to this has been added a couple of millions in the holder at Newcastle-on-Tyne. So now experience, in the gales, blizzards, and snowstorms that have disturbed the even tenour of our ways, during recent weeks, has been obtained with a holder, destitute of external framing, having a capacity of 3½ million cubic feet. Twenty and more years have passed since controversy raged on the subject of Mr. William Gadd's proposition and invention to override the conventional belief and practice of the gas engineer in the matter of guiding gasholders. Custom is hard to kill; and fears are difficult to assuage, when theoretical considerations suggest, in such a structure as a gasholder, some sacrifice through change of stability, and therefore of safety. The experience of to-day mocks the doubts that stubbornly held ground at that period and for some time after. At Newcastle, we find, the Gas Company keep a self-recording register of wind pressure night and day; and the new holder—which stands at the outlet of the valley to the Tyne in an exposed position, some 15 feet above the level of the adjoining ground, and is itself a high structure (140 odd

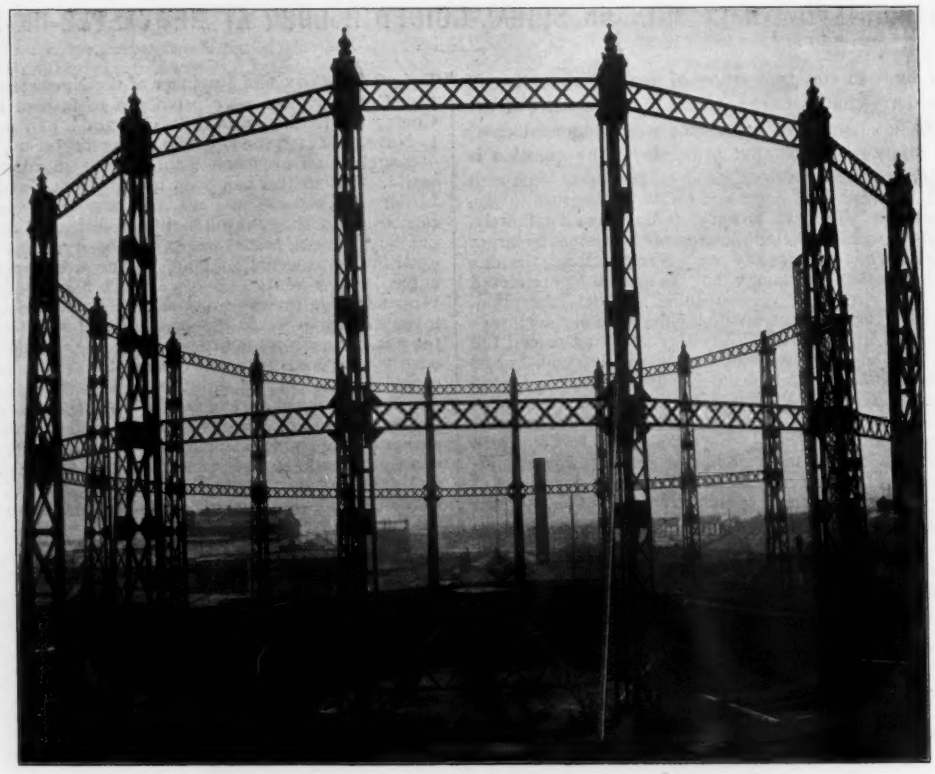


The New Three-and-a-Half Million Cubic Feet Spiral-Guided Gasholder at the Redheugh (Newcastle-on-Tyne) Gas-Works.

feet) when fully inflated—has been exposed to a wind pressure of no less than 52 miles per hour. The exceptional gales of the north-east coast and the snow storms of Christmas week have beaten about it; and there have been 22° of frost. The four-lift holder, of 3½ million cubic feet capacity, has worked on as in summer calm and temperature, and has fortified the confidence of both Mr. Gibb and Mr. Thomas Hardie, the Manager of the Redheugh works (who superintended the erection, and did it well), in their new and, in size, unique possession. With the severity and variety of test they are thoroughly satisfied.

The Cause and the Result of an Accident.

The new holder is interesting to the gas engineer not only on account of size, system of guiding, and so forth, but because it has found accommodation in a tank in which, until a year ago, there stood a column-guided holder, designed by that stalwart among engineers of a generation ago, Mr. V. Wyatt. The holder was put up by him in 1882. He had his fancies; and a few of them did not turn out so well as could have been wished. In the case of this holder, the lifts were somewhat shallow for the diameter; it had a tremendously heavy and rigid crown framing, which gave a great top weight; the guides were flat and so were the wheels; and there were no channels in the tank. Some two years ago, in the winter, the unexpected happened. The flat wheels ran off the flat guides; and the structure got severely damaged and jammed—the top weight assisting in making matters worse. It ought to be explained that there is a nest of six holders on the portion of the site of the Redheugh works separated from the manufacturing part by the Dunstan Road. The displaced holder had a capacity of 1¾ million cubic feet; but that of the new one being 3½ millions, the total storage of the six holders is to-day about 9¼ million cubic feet. The method of working at the station—and this was being done when the old holder met with the crippling accident—is to draw upon a holder by exhausters, and pump the gas to what is known as the Newcastle "distribution box," situated at the Elswick station, and connected up to the district governors, or if not wanted there, to the 5¾ million storage holder at St. Anthony's. The gas is drawn from the Redheugh station at the rate of about 600,000 cubic feet per hour; so that the holder runs up and down somewhat rapidly. Adjoining the holders is the pumping-house—containing two Gwynne exhausters, each of 300,000 cubic feet per hour capacity, driven by Crossley gas-engines of 55 brake horse power. These were put in before blowers for gas pressure raising and large volume gas delivery became the vogue. However, this is a little digression, but useful in an explanatory sense. Had the old two-lift gasholder been working at ordinary pressures, it is just possible, even though at the time of the accident there was stressful weather, it might have escaped; but the pull of the exhauster, and the whole combination of abetting circumstances, including details in design, conspired to do such damage that the question for the Engineer was whether there would not be an ultimate economy in abandoning the old holder and utilizing the tank for a new one. These were the conditions: The holder had



The Abandoned Gasholder—One-and-Three-Quarter Million Cubic Feet Capacity.

seen a quarter-of-a-century's service; owing to the design of the standards running up from the spreading base to small dimensions at the finials, it was impossible to economically extend them for the purpose of enlarging the capacity of the holder (as a matter of fact to have altered and extended them would have probably cost as much as putting in new ones); while there was also the cost of the rehabilitating work, together with the perpetuation of defects. Taking the conditions fully into consideration, it was deemed the wisest plan to rebuild on the spiral system, obtain double capacity in the same tank, and utilize towards this purpose the heavy expenditure that would have been entailed in putting the holder into an efficient working state. The wisdom of the decision arrived at is clear.

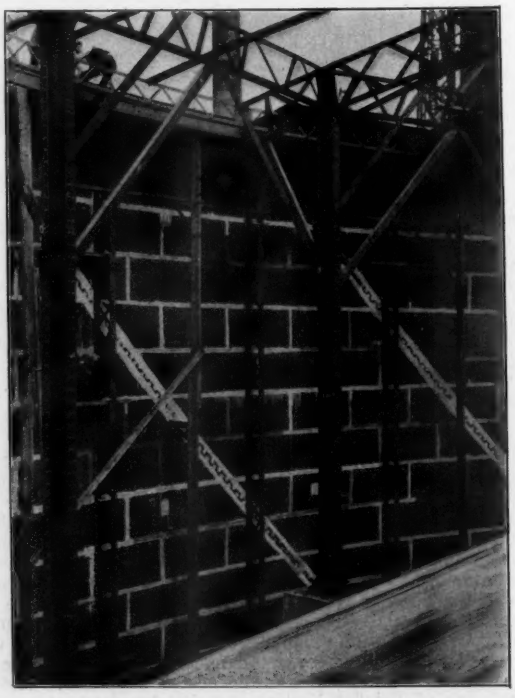
Excellent Workmanship—Utilizing Some of the Old Work in the New.

The fact that the old tank has been utilized for the new holder, as well as the roof framing (as hereafter explained) shows that the old holder was not without its good features. Only details in design and not workmanship stand open to criticism to-day. The contractors who erected the new spiral-guided holder, to the specification of Mr. Gibb, and who also dismantled the old structure—Messrs. R. & J. Dempster, Limited—we feel perfectly certain, would bear us out in saying that the framing was a splendid piece of workmanship. It took them practically a week to get out the first girder, the whole being so strongly riveted together. The standards themselves were formed of box type, rectangular in shape, and braced together by two rows of lattice girders, while the members of the standards were joined together by strong angle and T iron lattice bracing, firmly secured by suitable covering plates. Two of the standards are still in position, having been brought into use for supporting the steam-pipes of the anti-freezing arrangement. The tank of the old holder was also in splendid condition, having a concrete bottom, and cement faced dumpling, while the wall is of concrete, having an inside brick lining 9 inches thick built in cement, and between brickwork and concrete are 2 inches of pitch. It was in every way suitable for putting to good use. Respecting the roof-framing of the old holder, this is also of substantial character. The radial main-bars are of strong girders of the lattice type, and braced with circumferential girders of a similar character, which were found in good condition. This framing is now supported on stanchions in the tank, and receives the crown when the holder is at rest. It was a question of utilizing good work and good design in substantial parts, and discarding the bad design in detail, which latter had had such disastrous effect.

The Tank, and the Comparative Dimensions of the Old and New Structures.

The tank—the principal part still existing of the old structure—is 175 ft. 4½ in. in diameter by 38 ft. deep. The previous two-lift occupant of this tank had eighteen standards; and sixteen of these were carefully removed—the bed-plates being used for the support of the bottom roller carriages. The tops of these old bed-plates (with, of course, the exception of the two still bearing the standards supporting the anti-freezing apparatus) were cemented over and capped with plates; the old bolts being utilized for the purpose. To satisfactorily control a gasholder of this magnitude, 36 intermediate bed-plates for roller-carriages were required—two between each of the old bed-plates. The contractors drilled holes, by pneumatic power, into the existing brickwork, cutting suitable openings at the foot of these for the fixing of the anchor plates. Afterwards, all was thoroughly cemented up again, and the disturbed brickwork made sound.

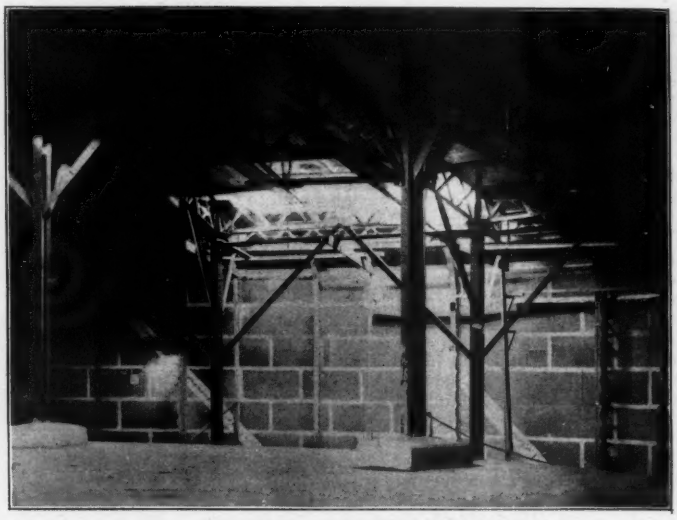
The new holder which now occupies this tank rises to about double the height of the old two-lift one. The inner lift of the latter was 169 ft. 4½ in. in diameter by 36 ft. 3 in. deep; and the outer lift 172 ft. 4½ in. by 36 ft. 7 in. So that, contrary to what is usual, the outer lift was deeper than the inner one, which again was one of Mr. Wyatt's fancies. The four-lift spiral-guided holder



The Stanchions Supporting the Old Crown Framing.

rises more than 140 feet above the tank when fully inflated; and it is then a conspicuous object. The four lifts are each 36 ft. 7 in. deep; and the diameters are as follows: Inner lift, 164 feet; second lift, 167 feet; third lift 170 feet; and outer lift, 173 feet. The explanation as to why the whole of the lifts are 36 ft. 7 in. deep is very simple. In spiral-guided holders, advantage can be taken of the full depth of the tank; for no carriages being necessary underneath the cups, the space ordinarily required in columned holders is dispensed with.

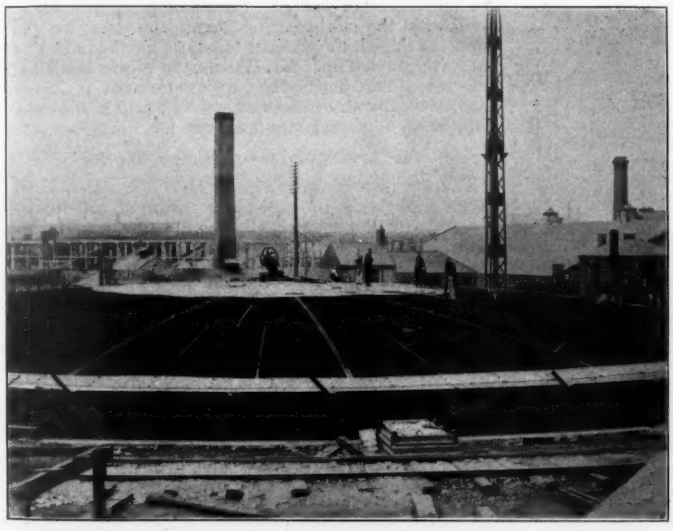
As before stated, the old roof trussing, with certain additions and modifications, was re-used for carrying the crown when at rest—supported on stanchions, as shown in one of our illustrations. The principal members had necessarily to be shortened, so as to admit of the extra lifts being introduced. The inlet and outlet pipes, which are 3 ft. 6 in. in diameter, were lengthened to meet the extra depth.



View Inside Tank, showing Roof Supporting Structure.

The Construction of the Lifts and Crown.

This being the largest holder yet erected on the spiral-guided system, we may include here some general details as to the construction of the lifts, without going into the minutiæ. The top curb of the inner lift is comprised of two 4½ in. by 3½ in. by ½ in. angles; and the lower curb is formed by 8 in. by 3½ in. channels. The vertical stays, 36 in number, consist of lattice girders, 18 in. deep at the foot, and increasing to about 3 ft. 9 in. at the upper end. The top portions of these vertical stays are secured to the stiff outer row of crown plates. The plating for the sides commences at ⅜ inch thick at the top, with butt joints, having cover-plates, ⅝ in. thick. The lower rows of the lift plates are ⅝ inch thick; the rows next the foregoing are ½ inch thick; and the remaining side sheets are all No. 10 B.W.G. Of course, worked into these sheets are the ⅝-inch spiral plates, to which are riveted the spiral guides.



Inner Lift and Crown Under Construction.

Concerning the plating for the crown, the outer row next to the top curb is ⅝ inch thick, having butt joints covered with 9 in. by ¾ in. jointers. The adjoining row is ⅝ inch thick, also butt-jointed. The next row is $\frac{3}{16}$ inch thick; the joints being of the ordinary lap type. The remaining rows, excepting the one adjoining the centre plate, are No. 10 B.W.G. There are, of course, the usual manholes, air-pipes, blow-offs, &c.; and a substantial handrail round the edge of the crown, supported by cast-iron stanchions.

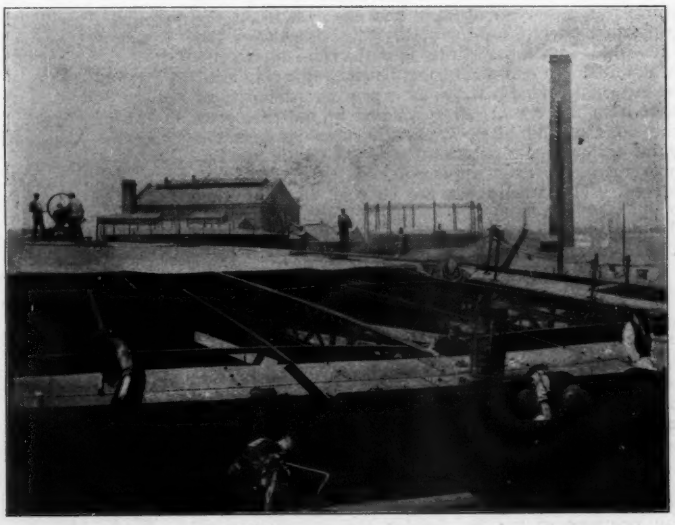
The second lift has 36 vertical stays, formed of 8 in. by 3½ in. steel channel; and the top row of side plates are ⅝ inch thick. The next row are ½ inch; the intermediate, No. 10 B.W.G. The hydraulic cup in each instance is 21 inches deep by 11 inches wide. The vertical stays and sheets of the third lift are practically a repetition of those of the second one. The outer lift, however, has 36 vertical stays of channel iron; and the bottom curbs are formed of two 8 in. by 3 in. by 20 lbs. steel channels, having the usual butt joints with ⅝ inch thick covers, and these are riveted back to back and to the lower row of side plates. The side sheets of this lift are ⅜ in., ¼ in., and No. 10 B.W.G. thick.

A Platform at each Junction of the Lifts.

It will have been remarked that the difference in the diameters of the several lifts is 3 feet, so that there is a difference of 18 inches between the edge of one lift and the plates of the next lift, as against perhaps the normal of about 12 inches. This extra width enables the top of each lift to be used as a platform; and it is easy (as was seen) for a man to walk round. This will be very convenient.

The Rollers and the Guides.

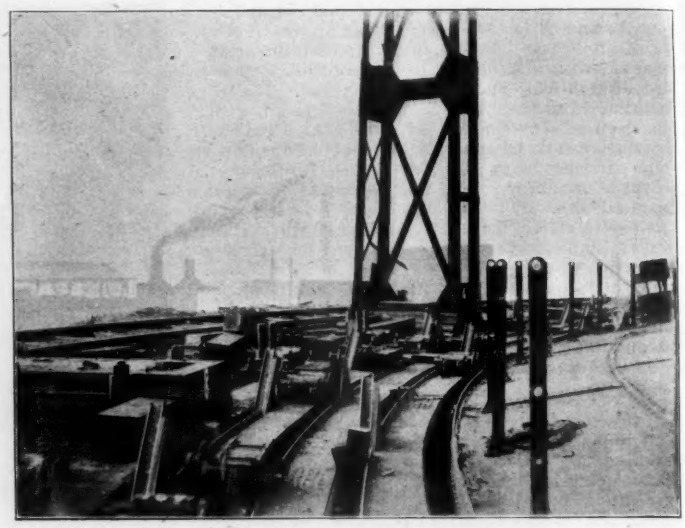
In dealing with the comparatively small amount of tank work that had to be performed in converting from ordinary guide-framing to the spiral system, reference has been made to the method of attaching the carriages to the tank; and now there are a few words to be said as to the rollers themselves. They are all of Messrs. R. & J. Dempster's newly patented type. Upon the tank, 54 pairs may be counted (remember the size of the holder), on the third lift 36 pairs, on the second lift 27 pairs, and on the inner lift 18 pairs. These rollers allow for expansion and contraction, which necessarily in a holder of this capacity must be provided for. An examination of the construction of the rollers shows plainly that, while they always have a firm grip on the spiral rail of the lift, yet they respond freely to any expansion that may be produced during the heat of summer, or from any other cause. It is seen, too, that the carriages throughout the structure have been specially designed to meet any strain thrown upon them. The carriages on the outer lift have axles that revolve with a long bearing—the rollers being fixed; whereas heretofore the rollers have revolved while the axles have remained rigid. The strains on the holder appear to have been very carefully considered; for a wind pressure of 40 lbs. per square foot has been the basis of calculation, and provision has been made on all the controlling parts to withstand practically four times this amount. It is therefore apparent, such being the case, that many gasholder structures hitherto considered strong would probably be laid low, or be put out of action, before



View showing Details of Construction, including a Spiral Plate.

the Newcastle holder could be affected. Furthermore, the provision named covers any possible contingency—such, for example, as an uneven snow load. It has been demonstrated by long experience in many places that spiral holders cannot get out of level; and this is the proof that any unequal strain must be more or less distributed throughout the entire vessel.

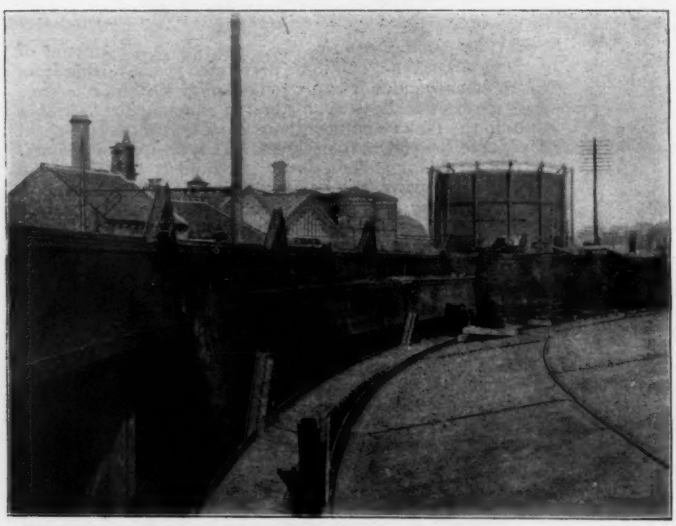
As to the spiral rails, a novelty (in so far as our observation goes) was immediately noticed on seeing the inflated gasholder. The rails have been placed (on alternate lifts) to the right hand and to the left hand. This will be seen from the illustration given of the new holder. The method, it is understood, has been adopted in order to obviate such a long travel of the lifts in the one direction. There are other points, however, that strike one about this spiral arrangement, though they are only perhaps of visual, not of actual, importance. There is no doubt that the alternate breaks make the holder more sightly than when the rails all run spirally in the one direction. The change undoubtedly gives the structure a bolder appearance, and a sense of greater rigidity. Looking at holders where the rails all run in the same direction, it seems to the eye as though a perpetual thrust obtains in the direction of travel. Whether or not this is merely an optical illusion, it is distinctly removed by the reverse arrangement of the spirals on alternate lifts.



View showing Some of the New Carriages.

Preserving the Appearance of the Holder.

In recently erected spiral-guided holders, provision has been made by Messrs. R. & J. Dempster for the preservation of the paint from the disfigurement caused by the unequal washing over the surface of rain water running from the lift curbs. The



View showing Extended Side Plates on Crown and Top.

method of doing this, as illustrated by the structure under notice, is to carry the upper row of side plates about 4 inches above the curb; and this forms a guttering (so to speak) round the outer edge of the lifts. Close to the upper end of each spiral rail, a curved opening has been made in the projecting part of the top plates; and this allows the rain water to use the spirals as paths from cup to cup of the lifts. In manufacturing districts, this plan must be especially of advantage, as it prevents deposits of soot from the crown being washed by the rain over the sides of the lifts, which otherwise renders the paint unsightly and deteriorates it. But with the improvement, the even appearance of the paint is preserved. The advantages are so real, that the idea might well be adapted on ordinary holders, by introducing some other means of conveying the water from cup to cup.

Continuous Ladder.

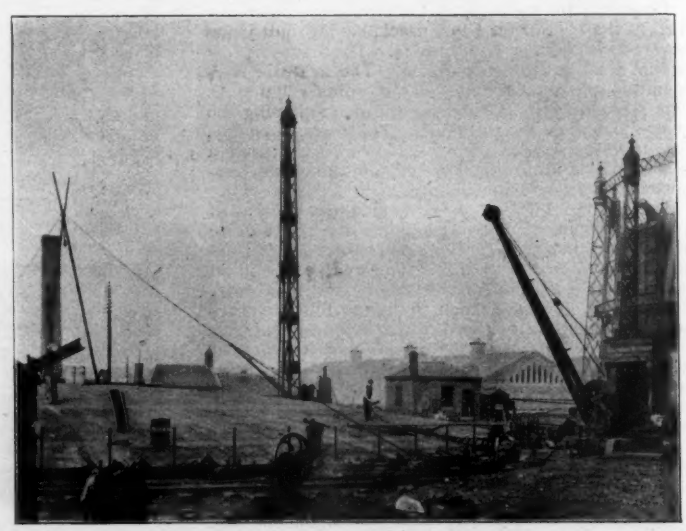
A continuous ladder has been constructed, giving access from the ground to the crown of the holder, with the lifts in any position. Although the sections of the ladder are in very different positions when the holder is at rest, directly a lift gears with the following one, the ladders come into line; and, when the holder is fully inflated, there is perfect ladder alignment throughout.

The Anti-Freezing Arrangements.

It looks a little peculiar, and must appear even more so when the lifts are on their rest-stones, to see two of the columns of the old holder still standing, with memorial-like isolation, on opposite sides of the holder tank. These columns are some 70 feet in height; and so must be very noticeable when the lifts (which, however, will not be a frequent occurrence) are all assembled in the tank. But they still do good service in association with the humble, but still valuable, duty of carrying the steam-pipes in connection with the anti-freezing arrangements. To the pipes so raised, the various injectors for the cups and tank are coupled up. Mr. Hardie, the Works Manager, informs us that during the very severe frost of Christmas week, the anti-freezers answered admirably; the cups being kept perfectly free from ice.

An Appreciation of Smart Work.

The specification prepared by Mr. Gibb was utilized in its entirety for the new holder, with, of course, the exception of the specialities which have been introduced from time to time by Messrs. R. & J. Dempster. But, in conversation with Mr. Gibb regarding the obvious excellencies of the work, he spoke with much appreciation, as an Engineer, of the manner in which the whole work had been carried out by, and of the promptitude shown by the contractors, as well as of the specially successful efforts they made to have the holder ready for use before the weightiest demands for gas of the winter came upon the Company. The work was begun last February. The old holder was first cut out and dismantled, material for the new one being placed on the ground while the clearing away of the old structure was in progress, so that the work of erection could immediately follow. The holder ready for use was delivered over to the Company in November. In other words, the big "job" was commenced and finished in ten days under ten months. But this was not done without running shifts throughout the twenty-four hours in the brightest of the summer months. It is a great pleasure to hear this further testimony by an Engineer to smart contracting work on the part of a British engineering firm. The credit for rapid execution, without loss of



The Spiral-Guided Holder Nearing Completion.

quality in workmanship, is too frequently regarded, for some peculiar reason, as being only properly attributable to contracting firms of other nations. But there can be advanced substantial contradiction from among the work of our own gas engineering firms; and this is an instance.

There is one thing with which Mr. Gibb is particularly impressed in connection with spiral-guided holders; and it is that it is of no use having anything but the best of workmanship, and the most scrupulously exacting of contractors. Smooth and frictionless working, and for the matter of that stability too, depend upon the accurate placing of guides and rollers; and in the most tempestuous weather of recent weeks this large holder has worked throughout with a clean screw-like motion. And when it is considered that the holder has been, as it will continue to be, generally worked under the somewhat abnormal travel in descent of 20 to 25 feet per hour, through the pumping away of the gas to the Elswick works or to the large holder at St. Anthony's, the point as to exactitude in construction will be accentuated.

Exceptional Work and Cost Comparisons.

There is the question as to cost. Of course, in this instance, there can be no comparison as to price per unit of capacity with any other holder of equal storage power; for the simple reason that the tank was used, and that the contract price included the cost of dismantling and removing the old holder, the necessary alterations to the tank, and so on. As a point of interest, however, it may be stated that the discarded 1¾ million holder erected in 1882 cost £11,603; and the estimate for the same work at the present time was £15,211. The cost price for the whole of the work involved, from beginning to the handing over of the 3½ million spiral-guided holder, was £18,000. The advantage to the Company is that in the tank that formerly contained a holder equal to only 1¾ million cubic feet, there now stands one capable of storing 3½ millions. It must be conceded, therefore, bearing in mind all the circumstances—the work entailed, and the time within which it was performed—that the price mentioned, calculated out to per 1000 cubic feet of capacity, is an exceedingly moderate one.

The Newcastle and Gateshead Gas Company, their Chief Engineer, and the Contractors must be congratulated on a piece of work of which all who have been associated with it are exceedingly proud. From the technical standpoint, Mr. Gibb and his Company must also be thanked for giving the opportunity for making an inspection of the holder, and for so freely placing at command information regarding this (in point of magnitude) fresh advance in columnless gasholder building, which information it is a pleasure to present to our readers.

GAS LIGHTING IN THE UNITED STATES.

Notwithstanding the fact that some issues of the American "Illuminating Engineer" seem to be entirely devoted to electric interests, either in the way of descriptions of installations or of work in which electric lighting units play an important part, there appears to be the wish to hold the balance even between the two competitors. Every now and again the acknowledgment is freely made that the gas industry is far from decadent, and that it may, in the hands of propagandists, show good progress, maintaining its position as a really first-class illuminant. It is remarked in the December issue that in the quality of illumination there is actually nothing to choose between the two; that recent improvements in inverted burners and more artistic accessories have kept gas on a par with electric light in respect to appearance; and that the argument of "vitiation of the air," still heard in Europe, has long since ceased to attract attention in America. It is further stated that gas for domestic lighting is likely to hold its supremacy for a long time to come, more particularly as it combines the advantages of being at once serviceable and economical for lighting, cooking, and heating.

Our contemporary, while remarking that gas for lighting purposes is still on the increase, has on several occasions insisted that the growing demand is not what it might be, considering the possibilities of the situation. The suggested slow progress is attributed chiefly to the absence of pushfulness, and the lack of that advocacy and advertisement which presumably are possible were illuminating engineers regularly called into requisition. The competing electrical companies "are not content with merely presenting their improved lamps and accessories; they follow up their presentation with expert knowledge and advice as to the best methods for their use." In this direction, although "gas lighting in point of efficiency still takes the lead," practically nothing has been done. The question is asked how long is it going to take the gas interests to wake up to the fact that in the meantime electric lighting, with the aid of an illuminating engineering branch, is outmarching them.

As an instance of what one Company—the Edison Electric Illuminating Company, of Boston—is doing, it is stated that a distinct illuminating engineering department was established, and all the customers advised that they were ready to send an expert lighting engineer free of charge to advise and suggest means and methods of both economy and efficiency in lighting; and it would seem that the result of the policy has been of a gratifying character, for not only is the department crowded with work but new business is coming in. We are nowadays accustomed in England to seeing the commercial or "district" side of a gas undertaking strenuously developed—particularly in the case of companies. New custom is eagerly sought, and expert advice given whenever possible. Fittings businesses, under experienced men, are frequently established with this end in view. It seems difficult therefore to credit the underlying suggestion of our contemporary's remarks that American gas undertakings are neglectful in the field of pure gas lighting.

In the December number of the "Illuminating Engineer," however, Mr. H. Thurston Owens somewhat confirms the impression thus conveyed. He gives credit to gas companies for having made the official inspection of newly-installed piping an established practice. In this direction they have been of considerabie service, inasmuch as they are thus able to guide architects and builders in the matter of sizes of pipes and similar things, to the obvious advantage of consumer and company alike. Guidance in the way of ample piping is distinctly necessary, since the quantity of gas to be passed tends in many cases to increase, particularly where gas is used for heat as well as light. Mr. Owens remarks that increases of from 2000 to 5000 and sometimes 10,000 cubic feet *per capita* are not at all unusual, and these indicate the necessity of the regular practice of pipe inspection. Mr. Owens says, however, that gas companies have been content only to issue rules as to pipe sizes; and he wonders why they stop there. Advice on the score of gas lighting units and their effective use is sorely needed; and in matters of this kind company inspectors can, without prolonged study, be of considerable service. Mr. Owens makes a remark, with which we are disposed to agree, that architects—and, we would add, consumers—welcome suggestions from the undertakings where they may not take kindly to "full fledged consulting illuminating engineers."

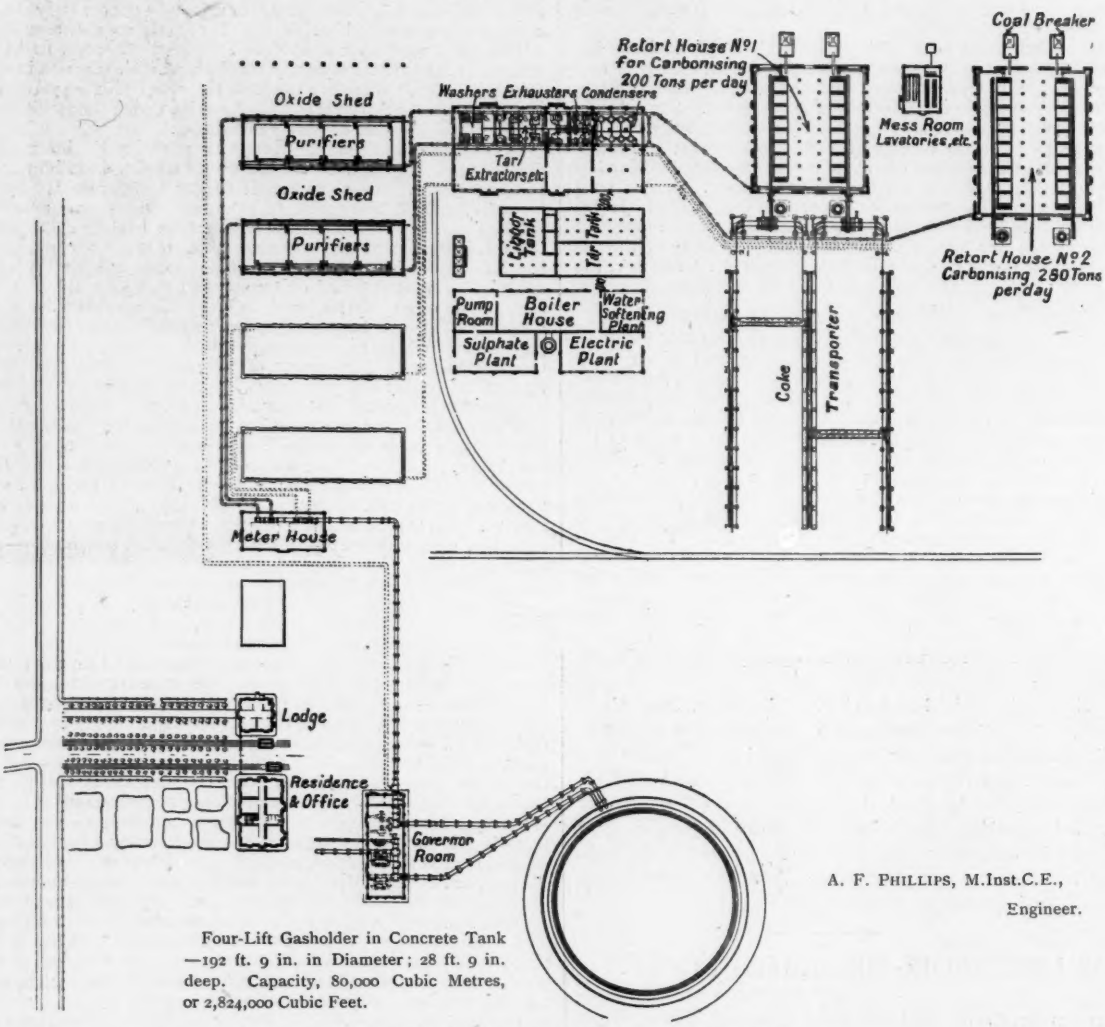
A further instance of the display of lethargy is given by the "Illuminating Engineer." An exhibition of gas appliances has recently been held under the joint auspices of the National Commercial Gas Association and the American Gas Institute. It is stated that out of the 71 firms who were showing gas apparatus, only thirteen—practically 16 per cent.—manufactured or dealt in lighting appliances. This is commented upon as, to say the least, rather remarkable, since as much as 60 to 75 per cent. of illuminating gas in America is said to be used for lighting purposes at the present time. Our contemporary suggests that the general character of the exhibition showed plainly either one of two things—that the manufacturers of gas stoves and heaters were much more keenly alive to the advantages of a popular exhibition and demonstration of their wares than were the makers of lighting devices, or that gas interests themselves were basing their hopes of future business upon the increased use of gas for heating and cooking, and were leaving the lighting side to take care of itself. The "Illuminating Engineer" comments upon the subsidiary position thus occupied by the latter in view of the facts that improvements have almost revolutionized gas-lighting appliances, and practically none in recent years have been noted in cooking and heating apparatus.

While gas undertakings are thus taken to task, manufacturers are not forgotten. The Editor, Mr. E. L. Elliott, in writing of artistic effects in gas-fixtures, draws a contrast between American and European conditions so far as manufacture is concerned. The American maker is said to be doing next to nothing in the way of designing new and artistic fittings for gas illumination. His European *confrère*, on the other hand, still looks upon the fixture as a good subject for design; and the prevailing ideas of decorative art are found exemplified quite as much in gas-fixtures as in electric. It is interesting to note that the Art Nouveau school of decorative art is mentioned by Mr. Elliott as apparently dominating the entire field in Europe at the present time; and examples of English and German gas-fixtures are given. Whether this design will be generally popular in the States remains to be seen; but in the meantime it is stated that American catalogues disclose the fact that by far the larger part of modern artistic gas-fixtures are either adaptations or reproductions of fittings that were originally produced from one to three centuries ago. Certainly, the "Illuminating Engineer" is doing a fair share in stimulating the gas-lighting industry in America.

The London and Southern District Junior Gas Association will meet at the Cripplegate Institute, Golden Lane, E.C., next Friday evening, when Mr. J. M. Campbell, of Luton, will read a paper on the "Construction and Erection of a One-and-a-Half Million Three-Lift Gasholder, and Concrete Tank for Same."

Manchester and District Junior Gas Association.—A very pleasant evening was spent by the members of the Association last Tuesday evening, at a "coffee" meeting held at the Cities Café Rooms, Deansgate, Manchester, when they continued their discussion of the subject of incandescent lighting, adjourned from a similar meeting in November. The subject was discussed from all points, and some interesting information was afforded and gathered in regard to burners, mantles, and other matters. Street lighting was also dealt with, and various interesting facts were given. The members who have not as yet been able to attend these informal meetings have certainly been the losers, the Hon. Secretary remarks in sending these few notes, as the various particulars brought out are not published, for reasons which are probably obvious to all.

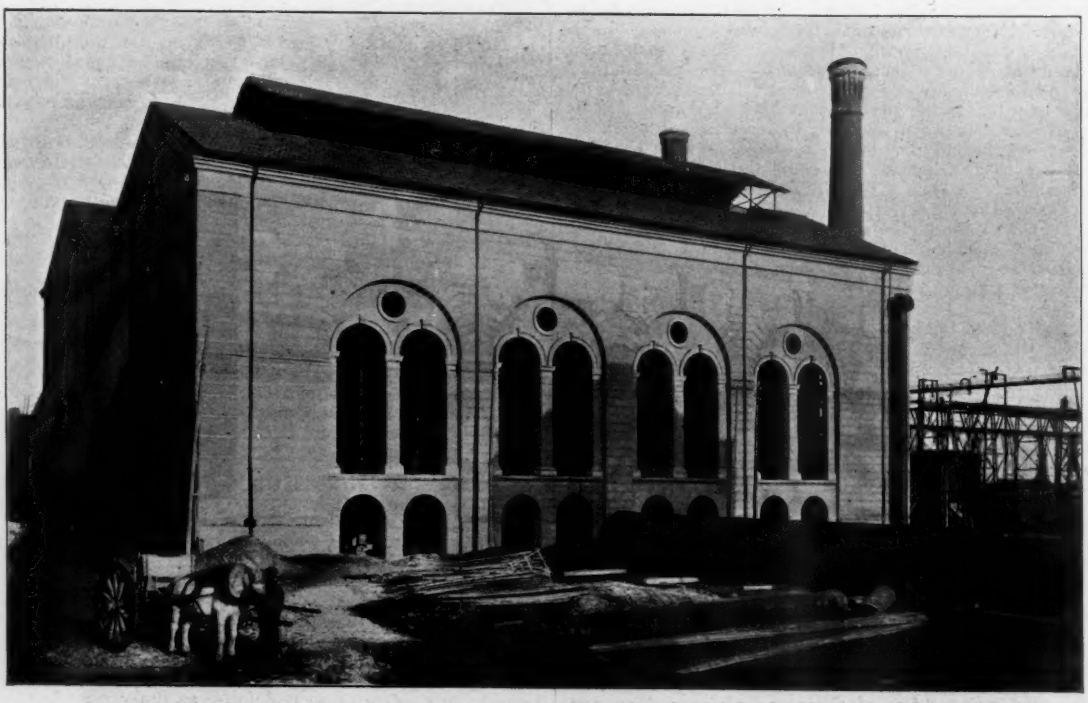
MILAN GAS SUPPLY.—THE NEW BOVISA WORKS OF THE UNION DES GAZ.



Four-Lift Gasholder in Concrete Tank —192 ft. 9 in. in Diameter; 28 ft. 9 in. deep. Capacity, 80,000 Cubic Metres, or 2,824,000 Cubic Feet.

A. F. PHILLIPS, M.Inst.C.E., Engineer.

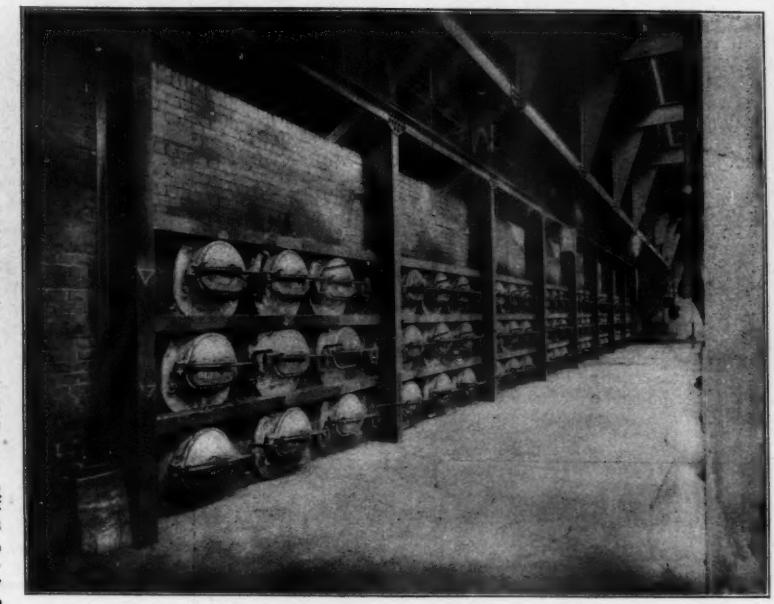
Plan showing the First Two Sections of the New Bovisa Gas-Works, Milan.



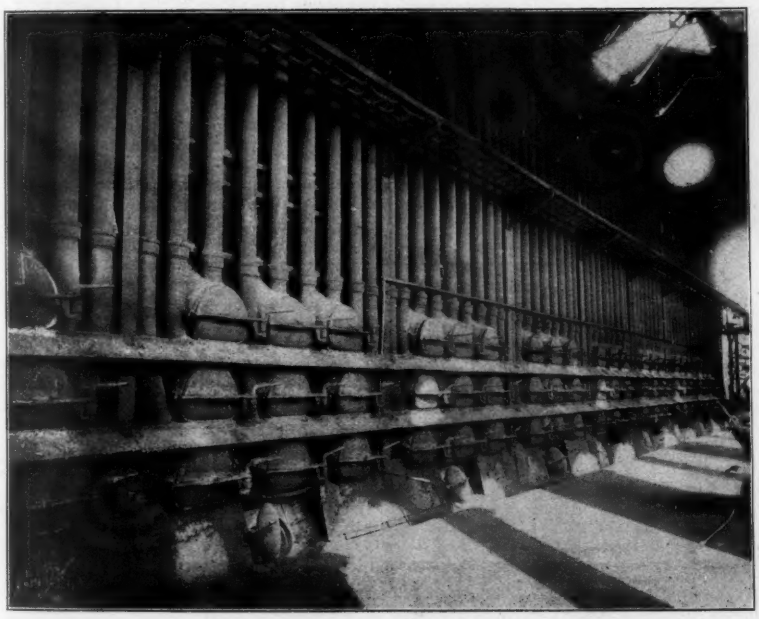
The Retort-House under Construction.

THE development of the City of Milan as an industrial centre during recent years has been surprising. The population is now considerably over 600,000; and the consumption of gas has increased even in greater proportion. The Compagnie L'Union des Gaz (who own the concession) had 110,000 consumers on their books at the end of last year; and the number increases at the rate of something like 700 per month. The Company have three works in Milan—San Celso, Porta Nuova, and Porta Venezia—at which extensions have from time to time been made to cope with the additional business till the ground was so fully occupied that further extensions were rendered impracticable.

The maximum daily quantity of coal carbonized in the winter was about 900 tons; and, the yearly increase of the gas business being about 10 per cent., it became necessary to find a site for a new works of sufficient area to provide for the increasing consumption for some years to come. The Company were fortunate in securing an excellent site at Bovisa on the North of the City, having an area of 40 acres, with railway communication with both the State and Nord Railways. This is the site, and on it the new works, to which the Chairman of the Continental Union Gas Company (Mr. Arthur Lucas) referred in his address to the shareholders at their meeting on the 8th ult. It will be remembered that Mr. Lucas



The Retort-House Interior—Charging-Stage.



The Retort-House Interior—Drawing-Stage.

mentioned that the site was of an area sufficient for works of the capacity which, he felt, would before long be required. It is not out of place here to also bring to memory the fact that he complimented one of his colleagues—Mr. Arthur F. Phillips, M.Inst.C.E.—on the way the plans for the utilization of the site had been laid out and the works designed.

The plans and specifications for the works having been prepared and tenders invited and contracts settled, the work of construction commenced in June, 1906. Eighteen months later—on Jan. 28 last year—the works were inaugurated—M. Lacombe, the Company's Agent-General, on the occasion charging the first retort. Since then, the working of the plant has proceeded in the most satisfactory manner.

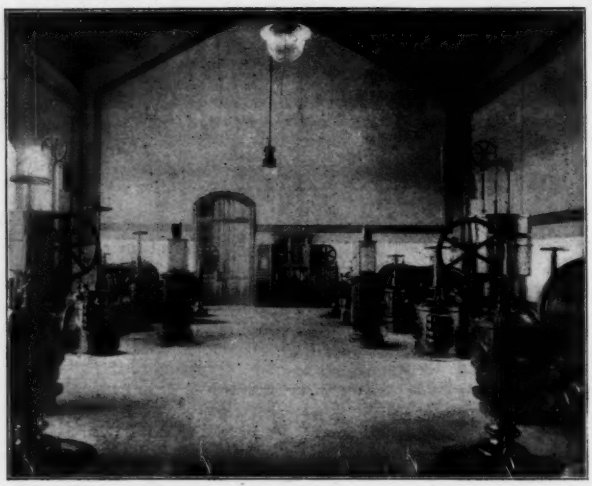
The works are designed for carbonizing 1200 tons of coal per day in sections of 200 and 250 tons; each section being complete in itself, so that additions can be made as required without disturbing the existing plant. The first section, as mentioned above, has been completed, and has been in use all the year. The second section is also finished, except the retorts, which are in course of construction. Together, the two houses will be capable of carbonizing 450 tons per day.

The works have been arranged with a view of reducing manual labour to a minimum; the principal materials—the coal and coke—being handled entirely by mechanical means.

Condenser, Exhauster, and Washer House.

In this climate, it is absolutely necessary that retort-houses should be designed so as to give ample ventilation in hot weather, in order that the men may work in comfort, with freedom from undue heat, smoke, and steam. Such ample ventilation has been provided in designing these new houses. The retorts in the first section are in benches of eight beds of nine retorts each, on the inclined system, set at an angle of 31°. They are of Ω shape, 20 in. by 16 in. at the top, tapering to 24 in. by 16 in. at the bottom, and 18 feet in length. The retorts in the first house are charged by West's travelling carriage, which weighs each charge as it is delivered into the retorts; the doors to the hoppers being automatically opened and closed by electric motors. The coke is removed from the retort-house by conveyors; and on its exit from the house, it is handled by the transporting plant, and deposited on the coke-heap.

From the retort-house the gas passes to the annular condensers (which are under cover) and on to the exhausters, which are in duplicate, and each capable of passing 2¼ million cubic feet per day—one set consisting of a pair, which can be run singly should only half the house be under fire. After the exhausters, the gas passes through a Pelouze tar-extractor, naphthalene washer, water condenser, and "Standard" washer, all arranged in a straight line in one building, with proper bye-passes.



Interior of the Exhauster-House.

The purifiers are arranged in sets of four, with slide-valves, under cover; each set having its own shed for the revivification of the oxide.

The station meters are in a separate building in pairs, each capable of passing 100,000 cubic feet per hour.

Interior of the Governor-House.

There is only one gasholder at present—four-lift—in a concrete tank; the capacity being 2,824,000 cubic feet.

The delivery of the gas is controlled by a 10-inch governor for the local supply, and a 40-inch governor for Milan. There is also an arrangement in the governor-house for forcing the gas under pressure into the gasholders in Milan. The trunk main from Bovisa to Milan is 40 inches in diameter.

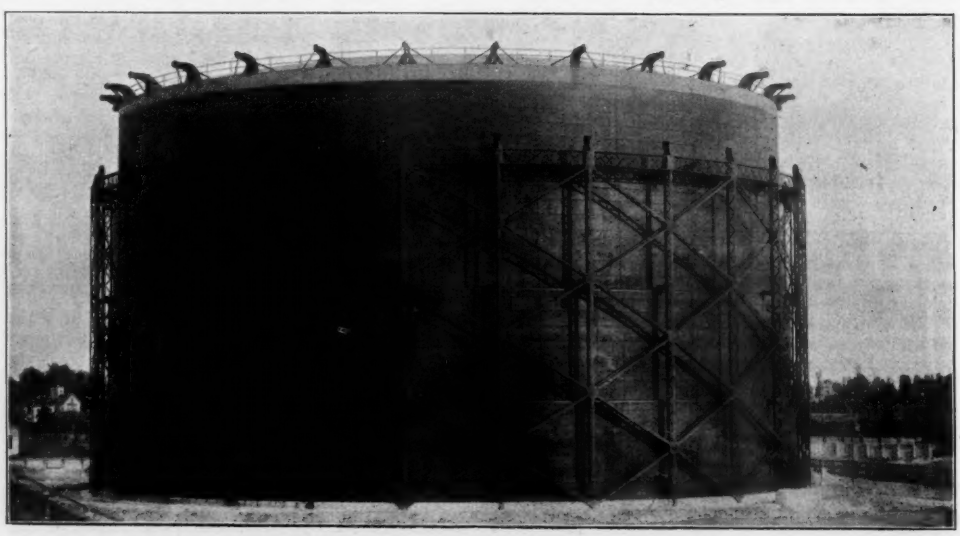
Steam is furnished to the works from four Stirling boilers, with "underfeed" stokers and forced draught. They are mechanically fed by breeze conveyors.

The plant, with the exception of the exhausters and washers, is all driven by electric motors; the current being taken from the municipal supply, with duplicate generating plant on the works.

A sulphate of ammonia plant is provided in duplicate; each set being capable of dealing with the ammoniacal liquor from 500 tons of coal daily.

The retorts in No. 1 house and all the plant connected with them were supplied by West's Gas Improvement Company, Limited; the second house with the retort-settings is being constructed by the Stettiner Company, of Stettin; the exhausters, condensers, washers, and purifiers by MM. Siry, Chamon, and Co.; the station meters and governors by Messrs. Parkinson and Cowan, Limited; the gasholder tank was constructed by Messrs. John Aird and Son; and the gasholder by Messrs. S. Cutler and Sons. The sulphate plant was supplied by Wilton's Chemical Engineering Company. The buildings were erected by Messrs. Maggioni Bros., of Milan. The trunk main, as well as the mains on the works, were laid by Messrs. John Aird and Son.

The whole of the works is lighted with high-pressure gas on the "Selas" system; and the result is most satisfactory.



The Four-Lift Gasholder—Capacity 2,824,000 Cubic Feet.

The death occurred recently, after a very short illness, at his residence at Goring-on-Thames, of Mr. John Egginton, J.P., for many years a Director of the Reading Gas Company. With feelings of great sorrow at the loss of an esteemed friend and colleague, the Directors of the Company at their last meeting passed the following resolution: "That the Directors of the Reading Gas Company record their sense of the great loss sustained by the Board in the death of their colleague, Mr. John Egginton, and their high appreciation of the extremely able and assiduous manner in which he performed his duties as a Director for over thirteen years. They also desire to offer their deep sympathy to Mrs. Egginton and the family in their bereavement."

TOWN GAS, PRODUCER GAS, AND ELECTRICITY.

By Philip W. Robson.

There is no doubt that the stress of competition between the departments of gas and electricity in the same town, whether under municipal management or otherwise, often produces some strange anomalies in the way in which gas and electricity are applied. The weakest must go to the wall; and if, for instance, the electricity department is managed more energetically and aggressively than the gas department, we find electricity pushed down everyone's throat for all sorts of purposes, without discrimination, many of which would without doubt be better and more economically served by gas. On the other hand, though gas engineers have not offended in this respect to anything like the same extent, they are not always impartial where the proper claims of electricity or producer gas are to be considered. These various prejudices are discussed and enlarged upon in the Technical Press; so that it might be thought, from a perusal of the electrical papers, that "gas" is an almost unspeakable thing. From the nature of things, the gas journals cannot take this sort of thing "lying down." So we get many conflicting statements, none of which lack emphasis, but, being so conflicting in their general character, must, when taken together, all convey the impression of being only partial renderings of the real truth of the matter.

Controversy is stimulating, and has pleasures of its own. But it is well sometimes to approach controversial topics from the philosophical standpoint, bearing in mind not only our own claims, but those of our opponents also. And there is a special value in so doing where problems of applied science are involved; for progress is rapid in these days. What is a doubtful experiment to-day may be an undisputed success in a year's time. Take, for instance, the introduction of suction-gas producers a few years ago. Most of us will remember the dark forebodings as to risks of poisoning, explosions, &c., &c., none of which have been fulfilled, with the result that these producers are now widely used all over the world. For such general reasons, I have endeavoured, in the following remarks, to review the relative position of town gas, producer gas, and electricity as alternatives to the community generally for the respective purposes of lighting, heating, and power; for undoubtedly the last three or four years have witnessed great changes. I will firstly deal with town gas.

Town Gas.

The first point which I would like to emphasize is that, while gas undertakings, both municipal and private, are in the majority of cases highly successful commercial concerns from the point of view of yielding a good return on the capital invested, the contrary is the case, generally speaking, with electricity departments or electrical supply companies. Various reasons are given for the unsatisfactory financial position of the latter; but, in my view, the true explanation will be found in the fact that gas has long been placed within the reach of even the humblest householder in the towns for lighting (and, to a large extent, for cooking), and it has been possible to cater for this universal demand on terms favourable alike to the consumer and the supply undertaking. So far as working-class householders are concerned, electricity, however, is still a luxury beyond their reach. Why electricity remains so expensive to the private consumer is another matter which I will touch upon presently.

I remember once approaching one of our largest gas companies to suggest that it would be to their advantage, in view of the advent of producer gas and the competition of electricity for power purposes, to supply gas at a considerably reduced figure for gas-engines, as those using them were large consumers and entitled to special terms. When discussing the matter with the general manager of the company in question, he told me he was much more anxious to have a gas-cooker in every household; for this would mean a far greater demand than all the gas-engines put together, while giving a good steady load factor on his works. I think he was perfectly right from his own point of view. Obviously the extended use of gas-stoves among what might be termed "the masses" must create an enormously greater demand for gas than exists at the present time; and if gas-fires (for heating rooms) were improved, their general adoption would not be long delayed. I fear, however, that most of them are rather imperfect pieces of apparatus at the present time; and it would appear that the question of heating by gas requires more consideration than it has hitherto received.

So far as lighting is concerned, I think that gas will still hold its own in conjunction with the improved systems of applying it for street lighting. For interior lighting, however, it will be generally agreed that, except in the matter of cost, the convenience and cleanliness of electricity make it specially suitable. Any considerable reduction in the cost of electricity to general consumers may cause it to be preferred to gas in ordinary households. But in view of the comparatively undeveloped fields for town gas to which I have referred above, and which, if properly tapped, must vastly increase the present demand for town gas, those interested in the latter may surely regard electric light developments with equanimity. At the same time, the advantages of supplying cheap gas for power purposes should not be lost sight of. I can never see the wisdom, when gas and electricity are both under municipal control, of the gas department standing quietly by and allowing engines to be replaced, or electric motors put in, on terms which are neither to the advantage of the municipality or the consumer.

Municipal gas departments have not made a practice of hiring out gas-engines. With municipal electricity departments, however, it is almost the invariable custom to hire out electric motors at a nominal rent. Thus a user may have a gas-engine which generates his power at the equivalent of anything from ½d. to 1d. per unit of electricity. As a gas consumer, he is a profitable customer of the corporation. The time may come when he requires a larger engine. The electricity department then comes along and offers to put in a motor at a small rent, and to do all the fixing and wiring free of charge. They will further offer the current at somewhere from 1d. to 1½d. per unit. They cannot generate and supply the current at this price; but the fact does not seem in any way to trouble them. And thus the final position is that the municipality loses a good paying gas consumer, and obtains in return an unprofitable electricity consumer, who, in addition, involves capital expenditure on the part of the municipality of anything from £50 to £500, according to the size of the installation. I am never able to see that this is sound business; it is specially bad in view of the increasing burdens of taxation—for, of course, the loss has to be made good from the rates.

Gas engineers should remember that if gas is supplied at from 1s. to 1s. 8d. per 1000 cubic feet to power users, it is very seldom that electricity at from ¾d. to 1d. per unit can compete; and they might, with advantage, take more heed of this branch of business. Speaking generally, therefore, I venture the opinion that the next few years will witness great advances in the use of town gas as fuel for heating and other domestic purposes, in addition to its use for power; and I am further of opinion that the increased demand which will thereby arise will much more than compensate for any loss of consumption due to the progress of electric lighting.

Electricity.

Rapid depreciation of plant, heavy cost of distribution, and high cost of production at the station, are all important physical conditions which have hitherto hampered most electricity undertakings. Other causes, which need not be entered into, have caused heavy over-capitalization in many cases; and it is open to grave doubt whether the general policy pursued by those responsible for these undertakings has been a wise or reasonable one. The gas-works have built up a large demand by touching an enormous number of small consumers, each of whom, however, has been a profitable customer. The electricity works have sought to swell their demand for current by encouraging a comparatively small number of large power users to take all their electrical energy from the public supply. This current has been sold either on a small margin of profit or at an absolute dead-loss. The important economic difference between these respective policies will be apparent to anyone. Meanwhile, the price for lighting current is kept at such a high figure that the average householder has to go without electricity—he cannot afford it.

It is not surprising that, under these circumstances, many electricity undertakings are in a somewhat precarious position; and attention was recently very fully drawn to the fact by a well-known electrical engineer (Mr. Snell, of London). The only hope he can see for the position lies in doing away with all small electricity stations and having a comparatively small number of very large stations dotted about the country, each supplying a group of towns. Personally, I consider this a somewhat doubtful business proposition, because, as I will presently show, there are simpler and more convenient means of improvement. Quite apart from personal opinions, however, no one will dispute that electrical developments, as might be expected in a comparatively young industry, are progressing very rapidly. He would be a bold man who would predict what radical changes are likely to be made in industrial electricity this next half-dozen years. It would occupy this space of time to get Mr. Snell's proposals into being; and I see a great risk that they would no sooner be completed than some new development would arise, which would make the whole of the plant installed practically out of date. We have seen so much of this sort of thing already, that it is difficult to appreciate the advantage of risking it again on a much larger scale.

Meanwhile, electrical engineers are coming to realize more and more the advantages of using gas-engines for dynamo driving in central stations. Birmingham has even gone so far as to invite offers for 4000 H.P. gas-engines, and many small stations are actually being driven by gas-engines at the present time. The great economy, convenience, and reliability of such engines cannot now be seriously questioned; and the remarkable difference between steam plants and gas plants is this, that while the economy of large steam-engines is much higher than small ones, the small gas-engine (of, say, 100 H.P.) is quite as economical as the largest gas unit made. Hence a small gas-power station working with a suction gas plant can actually produce its current at as low a rate per unit as in the largest station. A simple and convenient alternative to Mr. Snell's proposals would therefore be to replace wasteful steam plant with modern gas-engines.

Another important suggestion seems to follow from this almost as a matter of course. Why should not the gas-works and the electricity works, in the smaller towns at any rate, be combined? The coke made in the gas-works would then be used in the gas-producers supplying the gas-engines generating the electricity; and the combination would be a natural and an economical one. This kind of combination has long been in operation throughout France, with highly satisfactory results. The growing use of gas

power here should facilitate the fusion of the two departments in course of time, to the advantage of both.

Producer Gas.

Producer gas does not affect the ordinary householder. It is only used in industrial processes, either for power or for heating. It is, in the case of one notable installation in the Midlands, supplied in mains from a large central plant over a considerable area; but otherwise it is made in a self-contained suction or pressure plant on the users' own premises.

As to the supply of producer gas in bulk, it is difficult to see how it can be done excepting at an enormous distribution cost. The heating value of such gas varies between 130 and 150 B.Th.U. per cubic foot; and it contains about 60 per cent. by volume of absolutely inert components. In other words, the greater part of the gas which has to be distributed is of no value whatsoever. For a given heating result, therefore, about 4½ times more producer gas would have to be consumed than of average town gas; hence the mains have to be of enormous size and very costly. As to the economy of such distribution, everything must depend on obtaining a cheap fuel supply, and on the value of the bye-products. It is doubtful if the system will be greatly extended.

The really important application of producer gas is by means of the so-called suction-gas producer, which can be applied for driving gas-engines in any size from 10 H.P. upwards. Many thousands of them are now in actual operation, and have given every success on account of their low cost of working. The fuel originally used in such producers was Welsh or Scotch anthracite, but ordinary gas-works coke has since been widely and very successfully adopted.

Has the introduction of these suction gas plants really been against the interests of gas-works? Personally, I do not think so, because during the period over which they have been a factor at all, the competition has not been between town's gas and suction gas, but between gas power and electricity. It is the electrical people, in their eagerness to secure consumers, who have set the pace; not the maker of suction-gas plants. Had the latter not been introduced, the gas department would have lost gas-engine consumers all the same, because of the tempting offers of the electricity department to which I have already referred. In any case, gas-power developments abroad in connection with gas engines and producers have lately been such that had this country, out of consideration to any vested interests, ignored them, such action could only be characterized as foolish in the extreme. If producer gas cheapens the cost of manufacturing in any industry we cannot afford to lose the advantage. As we are an industrial community, we must take care not to kill the goose that lays the golden eggs. I think that the gas company I referred to in my previous remarks, who preferred gas-cookers to gas-engine consumers showed a proper appreciation of their future business possibilities. In other words, why should gas managers worry about a few power consumers when there is so much other business to be done, which they can do so well and wherein they have an undisputed field?

Nor should it be forgotten that since the suction-gas producer kept the gas-motor from being thrown aside altogether in this critical period, it has so far conferred an advantage on all of us; for if in the course of time the demand for a cheap heating gas for domestic purposes is altogether greater than that for a rich lighting gas as at present—with the result that the former is catered for rather than the latter—the use of town gas for engines will again become general. The gas-producer will have kept the gas-motor to the front meanwhile. I venture to commend these broad considerations to the attention of my many friends connected with gas-works as being the truth of the matter.

Conclusions.

My concluding suggestion is that the past few years strenuous competition between town gas, electricity, and producer gas has sufficiently cleared the air to indicate the legitimate sphere of all three. I submit that the highest future success with them will be attained along natural lines of development rather than by a continuance of what is often a useless antagonism and an overpressed competition.

I consider that modifications in the nature of the public supply of gas will enable every householder to enormously increase his demand for gas to be used for heating and cooking. This will cause the importance of gas lighting for houses to shrink, and to admit of the extended use of electric lighting on account of its cleanliness and convenience. Producer gas has a special sphere for power users and for many industrial processes. It is on these general lines that future progress is likely to be best made.

Reports of Gas Associations for 1908.—As announced elsewhere in the "Journal," this work is now ready. The volume contains the collected reports as given in our columns, of the proceedings at the meetings of the various District Gas Associations held last year. The technical matter occupies 576 pages, and is illustrated by 35 diagrams and a folding plate. Reference to any subject is facilitated by an index; and at the end of the book are given lists of the officers and members of the Associations. The volume, which is the twenty-sixth of the series, forms a useful companion to the "Transactions" of the Institution of Gas Engineers.

THE PRICE OF GAS FOR HEATING AND COOKING.

By W. Upton, of London.

The interest that is being displayed at present as to the future of the gas industry is a sign of the times; and apparently the subject is one that, while at the moment it is being largely treated from an academical point of view, will in the future, and in some instances in the immediate future, have to receive that serious consideration which it deserves and demands.

The position of the gas companies in England, it is interesting to note, has never been quite logical, inasmuch as while being styled "gas" companies, such a title should more strictly have been reduced to "coal gas" companies, for though progress has introduced oil gas, petrol gas, producer gas, and acetylene gas, all these have had to be developed outside the pale of the companies whose title was a generic one. As the recognized practice of the industry is evidently to confine itself to coal, there are to-day three openings for its energies—(1) illumination, (2) heating, and (3) power and trade purposes.

The first—thanks to good cheap fittings and mantles, and the energies of the companies, backed up by the powers of the slot-meter—has widely extended the circle of their clients, until in the case of a concern having no possible new neighbourhoods to develop, what looks like saturation point is rapidly approaching. In many cases, also, competition with electric light has resulted in the loss of a great number of good accounts, where the extra convenience and adaptability of the glow-lamp over the mantle has resulted in the displacement of the latter—relative cost not entering into the calculation at all.

Though improvements in incandescent burners and mantles are still to be looked for, yet they would only replace existing burners, and apparently will not widen appreciably the use of gas in the ordinary house for illumination purposes. It appears, then, that it is only a question of time before the lighting field is thoroughly worked out; and judging from what has been said of late by responsible heads of the industry, such an event is, in some cases, within the field of practical politics, and its business meaning duly noted—more especially as this result will have been arrived at under present conditions of price, and consequently no further lowering of the cost to the consumer could again widen the field. The real competitor of gas among the industrial workers is not electricity, but oil; and gas at about 2s. 6d. per 1000 cubic feet is quite capable of holding its own, and more.

The second point—heating—is bound up with the use of the cooker and gas-fire. Both these are applications where no competition is seriously experienced from electricity, and only to some extent from oil. The cooker has been, generally speaking, well pushed, till, in some instances, 60 per cent. of the consumers use such an apparatus. In such a case, it is again evident that the saturation-point will soon be attained, and a halt in the number capable of being placed will be reached. "Number" is used advisedly; for though it may be impossible to add to the quantity placed, it may yet be possible to increase their consumption.

Observation shows a general practice of depending upon the cooker entirely during the summer months, and upon the coal-range during the winter as (1) being cheaper, and (2) supplying hot water throughout the house. Notwithstanding all our lady demonstrators may state, where a large amount of cooking has to be done, and the cost of doing it is a consideration, as it is in the majority of households, the gas-cooker has to stand aside in favour of the coal-range—with gas at its present price. That gas has cleanliness, ease of use, and many other advantages over coal or coke for cooking, is undoubted. So, maybe, has the electric cooker—when it comes—over gas; but the cost of operating is the ruling factor. The question, therefore, is how to increase the use of gas on a district that is saturated, in regard to number, with gas-cookers.

The gas-fire field is still comparatively untapped. An average middle-class neighbourhood may have not 1 per cent. of the rooms provided with gas-fires, and never will have under present conditions. That large numbers of gas-fires are rented out each winter by many gas companies, and received back again each spring, shows clearly that the apparatus is looked upon as a luxury, and not as a standing necessity; and the great bulk of gas consumers use coal all the time, and everywhere. In the light of the present rather effective gas-stove, there can be but one reason for this great lag, and that is relative cost.

The third point—viz., power—is also in an undeveloped condition. Generally speaking, for small powers, the gas-engine has had a fair run; but cheap current, with the economy due to ease of switching off immediately the power is not required, has led to great development of small electric motors. For high powers—say, above 40 H.P.—town gas is quite out of it at lighting rates; and suction gas plants find a steady sale, no matter how much the fact may be blinked. Gas for trade purposes, in the great majority of cases, has so far but a small sale, and then chiefly for some special object for which cost does not so much matter; but in all uses for which gas has to compete, that of trade purposes will, generally speaking, have to absolutely meet solid fuel on its own ground at price for price, in which case, if found possible, it may have a great field of usefulness.

Now as gas to-day has to compete for a living, just as do other commercial propositions, it is clear that its methods must be

sufficiently flexible to meet the varying demands made upon it. The lighting field at present is divided roughly into two sections —(1) where electricity holds the premier position, through its convenience, and where cost does not count; and (2) where gas is on top, and where cost is everything, and therefore, as already mentioned, a reduction from the present figures for lighting purposes would not induce the adoption of an extra gas-burner. The heating and power fields are both undeveloped, and are full of potentialities for the future, if treated aright; but the heating field must be able to compete with coal, and that of power against electricity and suction gas, if they are to be catered for to any considerable extent.

Now, having defined the position, it remains to propose some method by which the same may be exploited; and here the contentious field is entered. All new, or nearly new, proposals for altering or modifying the *status quo* are met with varied views, and generally opposition, until in course of time the logic of events forces or unfolds a solution. In the writer's opinion, as already intimated, a reduction from the present low rates in the price of gas used for illuminating purposes will meet with no response as regards consumption; and consequently it would be bad business to make any reduction. The heating and cooking branch of the business, on the other hand, will certainly repay for continued reductions in price, until a point is reached where cooking and heating by gas favourably compares with the coal-range as to cost, when the many admitted advantages of gaseous fuel will gain the day over the use of solid fuel.

As to what this price is to be, and how it may be logically arrived at, opinions naturally vary, and vary strongly and widely. The one means that would throw light upon the subject, to the writer's knowledge, has never apparently been published or dealt with—viz., that of prime-costing the accounts, apportioning to each department the exact costs of dealing with its branch of the business, and giving credit for the portion of revenue that results from its operations. Such an analysis is not possible from the published accounts, as the gas used in public lamps and by the heating and cooking department are not separated; but for those who may happen to be in a position to deal in this manner with their accounts, such an investigation would throw considerable light upon the commercial possibilities of the different sections. A further analysis into their correct groupings of standing and running expenses of the charges that go to form the total cost of gas delivered, should then be made; for, as is generally known, though seldom recollected when dealing with such a subject, while the running charges keep arithmetical step with increases, standing charges do not. Figuring on prospective reductions, such an examination results in much light being thrown upon the position of the undertaking as a commercial proposition.

That the consumption per customer is far from what it might be, is clearly shown by the published analyses of gas undertakings. Taking, as an illustration, a company in a fairly good neighbourhood, the yearly consumption averages about 36,000 cubic feet, or (say) 100 cubic feet per day, equivalent to about a 3¼-hour run on a 5-light meter. Surely no one can be satisfied with such a result.

The great hindrance to the further adoption (even under present conditions as to price) of gas-fires, is the usual absolute lack of run connections; for the average householder fights shy of having workmen in the house. This being so, it necessitates some arrangement being entered into with builders and owners of houses—on a liberal basis, if needful—so that connections may be put in. In the writer's neighbourhood, great numbers of new houses are erected yearly; and a few shillings extra would enable a supplementary service to be run to each fireplace. But nothing is done; and later on the gasman asks in vain for an order for a gas-fire. The cost would be easily covered in a year or so from the extra consumption. Since the invention of the small, neat, compact, and accurate Rotary meter, a serious difficulty has been removed from the way of the introduction of the gas-fire; for a separate service and meter previously made the proposition of differential prices an impossible one. This little instrument can, however, be attached to any stove or cooker; and the quantity it indicated would receive the discount off the lighting rate.

The third section—viz., trade purposes—served with a similar supplementary meter, should receive most favourable consideration. As an illustration, take a gas-engine of (say) 20 B.H.P., working 50 hours per week. Such a motor would be the equivalent of twenty private consumers of the status already touched on; and when the cost of collecting, bad debts, clerical work, and capital outlay on mains and services are taken into account, surely such a consumer may easily be of more value than the twenty. And so on through all the trade uses of gas.

With regard to that bogey, so much discussed at the end of the last century, as to the larger mains necessary in the event of consumption advancing, the answer will have to be short though emphatic. Boosting in all its forms has come to stay. Either a single main or a ring-main round the district will take care of all the requirements; and should such a system be looked upon as a departure from the severe simplicity of gas supply as exemplified by the practice the past hundred years, the answer logically is that, if simplicity is to be the ruling factor, why were candles departed from, or the pine torch. Another point, still unsettled, though one that in due time, through the pressure of business economics, will have to be solved, is the conversion of a larger proportion than the present 15 per cent. of our raw material into the finished product. A business that rejects 70 per cent. or so of its raw material is not by any means a technical success.

Much more may be done than is being done at present to develop the ground; and much more will have to be done in the future to keep our present premier position.

GAS CONSUMERS AND THEIR ACCOUNTS.

[COMMUNICATED.]

SOME novel ideas concerning gas consumers and their account transactions come to hand from Mr. G. J. Cox, who, as Chief Meter Inspector to the Metropolitan Gas Company of Melbourne for the past 26 years, may be considered as having a practical knowledge of the matter he deals with in his communication.

The central feature of the arrangements formulated by Mr. Cox is that, given the necessary facilities (which are claimed to be simple and quite practicable), gas consumers can, and should, as a rule, be trusted to present to themselves, from time to time, their own accounts for gas supplied, and be encouraged to promptly tender payment for such supplies (as assessed by their own efforts), and so earn a concession or discount off their accounts in a manner that would specially interest them in their meter records. It would also enable meter readings to be concurrently recorded on a fixed date, and would save the gas supply undertaking (or at any rate largely modify) the strenuous task of specially reading meters for account-rendering purposes, and the labour of collecting such accounts. Also, both in the case of the ordinary meter inspection and in the transactions of the prepayment collectors, the data that would be furnished by the consumers in the system propounded by Mr. Cox provides a check upon the returns given into the office staff by the inspection and the prepaid collection staff. Obviously if such data were available in connection with all the meters, a definite comparison between the output and the returns from the consumers' meters would be available from time to time. The diagrams will show how the subject is worked out.

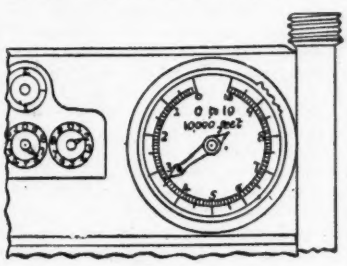


Fig. 1.

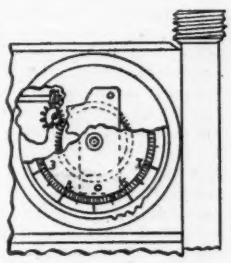


Fig. 2.

The meters would be fitted with a consumption dial and indicator, distinct from the ordinary index, as seen in fig. 1. A very simple form of gearing is provided by Mr. Cox to drive the indicator off the index-train. To attach it does not necessitate disturbing the meter or index structure in any way, beyond taking off the meter-top. But, unlike all other consumption indicators applied to consumers' meters (so far as Mr. Cox is aware), the indicator provided in this scheme is absolutely under the control of

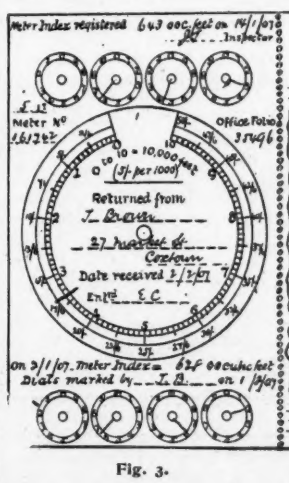


Fig. 3.

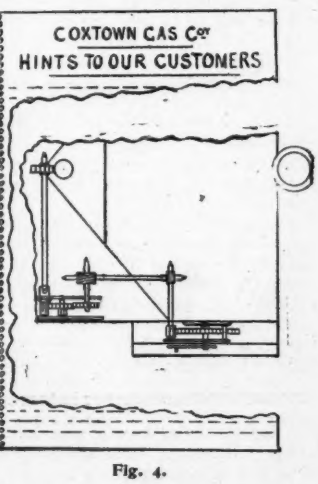


Fig. 4.

the consumer, and is held on its arbor by a split boss, or by some other familiar friction-clutch device, so that the consumer may turn and adjust the indicator as may be necessary. In such an arrangement, the ordinary index necessarily retains its position as the Court of Appeal, should circumstances connected with an account demand special reference to it.

The proposed system in no wise dispenses with a periodical official inspection, but enables the inspectors to move about their

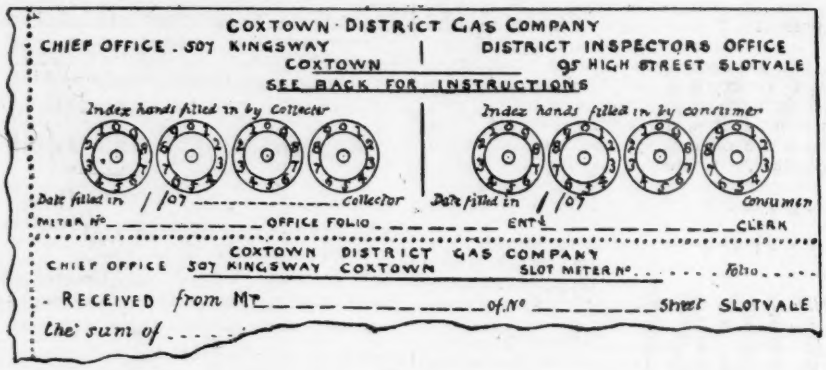

COXTOWN DISTRICT GAS COMPANY
CHIEF OFFICE . 307 KINGSWAY COXTOWN
DISTRICT INSPECTORS OFFICE
95 HIGH STREET SLOTVALE
SEE BACK FOR INSTRUCTIONS
Index hands filled in by collector
Index hands filled in by consumer
Date filled in / /07 Collector
Date filled in / /07 Consumer
METER No. OFFICE FOLIO ENT'D CLERK
COXTOWN DISTRICT GAS COMPANY
CHIEF OFFICE 307 KINGSWAY COXTOWN
SLOT METER No. Folio
RECEIVED from Mr. of No. Street SLOTVALE
the sum of

Fig. 5.

districts at variable dates that would be unknown to the consumers, and with more freedom and deliberation than is practicable under the limited time available when the inspection is primarily to collect the necessary data for account-rendering purposes. At a periodical inspection, an officer endorses the card shown in fig. 3 with the then reading of the meter-index. As an object-lesson to the consumer, the top set of pointerless index-dial diagrams shown may be provided, and the position of the index-pointers be marked in such diagrams in rough strokes by the inspector, as illustrated. Such diagrams are not essential to the scheme; and the numerical endorsement and date are all that is really necessary. The card previously prepared in the office, endorsed with such matter as may be desirable for identification purposes, and including the last reading of the index on which a debit was made against the consumer's account, may either be delivered to the consumer by the officer on his inspection round, or such customer may have obtained the card from the office prior to the inspection visit. In either case, the customer takes, or resumes possession of, the card after the inspector's endorsement, and on a date instructed fills in strokes to represent the then position of the index pointers, on the lowest set of dial diagrams provided. Preferably, he pricks the circle on the central diagram, at a point representing the position reached by the consumption indicator, after which the consumer sets the indicator back to zero on the meter-dial, as the first movement in a fresh cycle of operations.

If the card is made in a double form, divided by a perforation as partly shown, a similar consumption diagram might be printed on the reverse side of the second half, so that, when the card was folded, the under diagram would also be pricked through and be retained by the consumer. The reverse side of the diagram section of the card shown might be set out as a post-card, with the office address on it.

The required data being secured on the card, remuneration for services rendered in this direction should be subject to the card being received at the office promptly, and preferably should be a matter distinct from any consideration for prompt payment. As will be seen, the consumer knows the amount of his liability for gas when presenting the card; so that, if disposed, he can present the card at the office and forthwith pay his account, and secure in one transaction the fullest concession he is entitled to, for services rendered and for prompt payment of account.

Consumption indicators in combination with cash-value indicators applied to gas-meters are very well known to gas men; but, as will be noted, Mr. Cox employs the consumption and the cash-value indicators in a separated form. By keeping the cash-value indications off the meter-dial, any alteration in the rate for gas does not involve a new dial to the meter, but simply requires a new printing block for the consumption diagram. With the cash value applied to the card diagram, in marking the position of the consumption-indicator thereon, the customer is brought directly in contact with the cash-value indication, and has all the necessary information before him as to his indebtedness, just as concise as though a conventional form of account had been rendered.

The illustrations given in the diagrams presuppose that Mr. Brown has a meter, the index reading of which on Jan. 2, 1907, was 62,800 feet. The meter was officially inspected on Jan. 14, 1907, and the card endorsed showing the index as then 64,300. Brown fills in pointer strokes to the diagrams provided, on Feb. 1, 1907, which thus represents an index-reading of 66,200 on that date; and a month's consumption shown on the indicator as 3400 is quite consistent with the two index readings shown on the card. If Brown (under inducement) offered payment when presenting his card, on the statements shown thereon, no difficulty would present itself to a clerk experienced in index reading that would prevent a receipt "on account" issuing to Brown at once; and if Brown asked for a new card, a few moments' work would provide him with one for the next month's records.

If a customer were disposed to make a misrepresentation on his card as to his consumption, he would also need to falsify the diagrammatic reading of the index he presents, to make the reading tally with the false consumption that he indicated. If such a customer were expert enough for this, and got his statement of account accepted for the time being, the following official inspection would at once reveal any inconsistency; and any fraudulently disposed individual would soon learn there was nothing to be gained for his trouble. As in the case of prepayment-meter customers, those receiving a supply of gas under such a system should be expected to sign an undertaking to abide by the ordinary index reading of the meter.

Under the system broadly outlined by Mr. Cox, the consumers are called upon individually to help the business by means of a comparatively small but (to many) interesting service, which, if rendered, would, among other things, impress the fact of a gas account owing upon the consumer's memory; and, instead of a gas supply undertaking simply giving discounts for the prompt payment of an account laboriously formulated and rendered, allowances off accounts could be made more attractive to the consumers. Mr. Cox is of opinion that, with a little patience in educating gas consumers in accordance with his ideas, customers would be induced to take a special interest in following up their gas consumption, and feel a kind of minor co-parnership interest in a proceeding which, even in these days, many intelligent customers complain is all a mystery to them. In the course of time, such customers might be induced to mark the progress of their consumption at comparatively short intervals, and so provide data to compare against the output, covering shorter intervals than data furnished by the account covering period.

Various details which are not now referred to will suggest themselves to those accustomed to dealing with this section of the business of a gas-supply undertaking; and though the radical nature of the proposals of Mr. Cox are at first acquaintance somewhat startling, when the possibilities of such a system are more fully considered, it certainly claims attention from those whom it concerns.

It is obvious that no system of concurrent index reading can be of any use for statistical purposes, unless the indices of the prepayment meters are recorded on the same date as those of the ordinary meters. In the system propounded by Mr. Cox, the necessary provision for including such index readings is made in the following manner, and in a way that enables the readings to check the returns made by the collectors. In fig. 5, the collector's receipt form is shown as divided into two sections by a horizontal line of perforation. At the meter clearance, the collector marks a diagrammatic reading of the meter-index on one of the sets of pointerless dial diagrams provided on the upper section of the receipt form. He passes the receipt to the consumer, who, on a date as instructed, marks in the then position of the index-pointers on the other set of diagrams. Then, if the slip (detached from the actual receipt) consistently marked reaches the office within an allotted time, it is redeemed by a cash payment. In all districts where this class of customers were fairly numerous, local redeeming centres could be temporarily set up (say) one day per month, to give customers easy facilities for exchange, as it will be realized that the amount to be paid for the service rendered would necessarily be but small to each individual.

Mr. Cox does not claim that his system would be so much a means of reducing the cost of meter inspection and account collection, but rather that it would be a simplification of the work now involved, and allow the application of an advantageous policy of attracting consumers' interests and goodwill, by diverting to them, in the attractive shape of allowances, a portion of the amount now necessary to be paid in salaries and wages for the comparatively cumbersome and tedious process that has hitherto obtained among us.

South-East of Ireland Gas Association.—We learn from the Hon. Secretary and Treasurer (Mr. J. F. Tyndall, of Wicklow) that the next quarterly meeting of the Association will be held at the Waterford Gas-Works on the 2nd prox., under the presidency of Mr. D. W. Tooms, of Fermoy. Two papers will be submitted for discussion—one being "A Study in Producer Design," by the Hon. Secretary; and the other on "The Prospects of the Gas Industry in South-East Ireland," by Mr. George Lennon. The members will consider the subject of the Livesey Memorial, and also a motion to be proposed by Mr. J. G. Tooms, of Waterford: "That in future the Association shall hold one general meeting for all members in each year; that three other meetings shall be held, confined to gas engineers and managers only, they being members of the Association; and that all rules contrary to this resolution be rescinded."

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Duisburg	50	,, ,, (Repeat Order No. 3.)	84
Solingen	30	Berlin—Weissensee	58
Ludwigshafen	30	Berlin—Tegel	10
Zürich	100	Chemnitz	60
Düsseldorf	70	Worms	30
Offenbach	80	Charlottenburg	70
Brandenburg	60	City of Berlin—Danzigerstrasse	240
Trieste	20	City of Berlin—Schmargendorf	80
Elberfeld	120	Rio de Janeiro	140
Frankfort—Bockenheim	120	Sunderland	60
Genoa	60	Brussels—Forest	120
Magdeburg	80	Warsaw	120
Hamburg—Grasbrook	50	Munich—Gladbach	50
Aschaffenburg	8	Bremen	160
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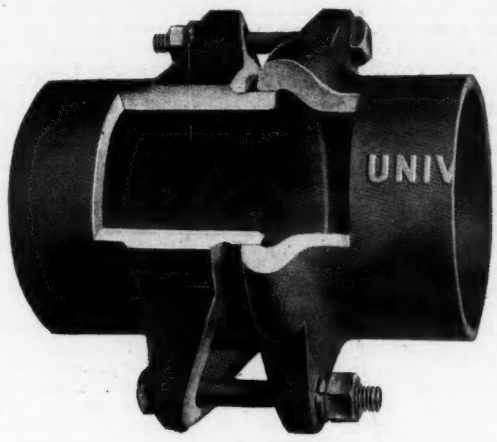
WHOLESALE AGENTS.

THE "UNIVERSAL" PIPE JOINT.

NUMEROUS advantages are claimed for the "Universal" cast-iron pipe joint, which is manufactured by the Central Foundry Company, of New York. The pipe is listed in sizes of from 2 inches to 20 inches internal diameter; and it is being used by a large number of the most prominent gas and water companies throughout the United States, as well as by the Government and many other large undertakings. Mr. J. L. Sardy, the Manager of the London Branch of the Company, whose address is at Audrey House, Ely Place, E.C., is in great hopes of doing big business in the pipes on this side; and as the matter is one that must naturally be of interest to "JOURNAL" readers, no apology is necessary for referring to it here.



The Universal Pipe Joint.

The accompanying illustration is practically self-explanatory of the arrangement; and it will be seen that the joint is made up iron to iron, without packing or gasket of any kind. This is a source of economy, inasmuch as it saves all cost of lead, jute, &c., in addition to reducing largely the amount of labour required. The ends of the pipe are machined male and female on a slight straight taper; and they are found to make up an absolutely tight joint. When the machining is completed at the foundry, these ends are covered with a light-bodied grease, to prevent rusting in transit. As the pipe is being laid, this grease is rubbed off, and a good joint paste applied. The ends of the pipe can then be brought into position and bolted up. Thus making a "Universal" joint is a very simple operation, and one that should take but little time. In fact, the rapidity with which the work can be accomplished is another of the points urged in favour of the joint. The pipe is made in 6 feet lengths, and is adaptable for the highest pressures—say, for a fire service with a working pressure of 350 lbs. per square inch. The tests of the different sizes carried out at the foundry are in no case at less than twice the working pressure.

The principal advantages which the manufacturers claim for the pipe may in conclusion be enumerated. The first is that the joint is absolutely tight; and the second is that the pipe costs less when laid in the trench ready for use than any other cast-iron pipe. Then it may be important to bear in mind, from the point of view of economy, that it can be extensively curved up, down, or sideways, and will still make up tight. From what has been said, it will be gathered that the pipe is particularly well adapted for laying under water, or in trenches partially filled with water. The joint is said to be unaffected by jar, shock, vibration, expansion, or contraction; while it is in itself a safeguard against electrolysis, as it forms a homogeneous line, iron to iron, which will conduct electricity without any destruction to the line.

Departmental Decisions.—We have received from Mr. S. Edgecumbe Rogers, the last quarterly issue (No. 13) of the useful series of pamphlets bearing the above title which he has published, in which he presents in a concise form decisions of the Boards of Agriculture and Education, Inland Revenue, and the Local Government Board on matters coming before them, as well as the judgments on questions of local government given by the Courts. The pamphlet is published at No. 27A, Farringdon Street, E.C., at the price of 2s.

Suction-Gas Plants.—We have received from the publishers, Messrs. Charles Griffin and Co., Limited, one of their series of scientific text-books bearing the above title. It is the production of Mr. C. Alfred Smith, B.Sc. (Eng.), Assistant Professor of Engineering in the East London College, and the contents consist of a course of three lectures given in that establishment, which have been published at the request of many of the engineers who attended them. Pending the fuller notice of the book which we hope to give in an early issue, it may be mentioned that the text, which is freely illustrated, occupies about 200 pages; and that the price is 5s. net.

THE LATEST ADVANCES IN STREET LIGHTING IN BERLIN.

By Professor H. DREHSCHMIDT.

THE following is an abstract translation of an article, in the "Journal für Gasbeleuchtung" of the 16th inst., by Professor H. Drehschmidt, of the Tegel Gas-Works of the Berlin Corporation, on "The Latest Advances in the Street Lighting of Berlin, and a Comparison of Them with Earlier Methods of Lighting." The article, as will be seen, is directed mainly to the refutation of the contentions made by Dr. Bloch in a recent communication (*vide* "JOURNAL," Vol. CIV., p. 561), that the latest types of electric arc lamps installed in certain streets of Berlin were as efficient and economical as the high-pressure inverted gas-lamps used in many other streets.

Dr. Bloch, in his recent communication, said that data he had set forth would admit of the latest methods of lighting being compared one with the other and with earlier methods for all ordinary cases of street lighting in a simple and unobjectionable manner. Exception must be taken to this statement on the ground that the measurements on which Dr. Bloch's comparisons rest are not free from objection. In regard to high-pressure inverted gas-lighting, the observations were made on the lamps in the Königgrätzerstrasse at the end of November, and in the Potsdamerstrasse at the end of May, 1908, when the installation and adjustment of the lamps had not been completed. The high-pressure inverted gas-lamps were a new type, requiring different treatment from the older high-pressure upturned lamps; and the staff had to acquire experience in the manipulation of, and attendance on, them. It must be obvious to any technical man therefore that for some time after their installation there would be irregularities and defects in the maintenance of them. It must have been clear from the broken globes and badly-shaped mantles in many cases that there were defects and failures to be rectified. The irregularities shown by Dr. Bloch's curves in regard to the light afforded by adjacent lamps should have caused him to pause in making inferences of a conclusive character from his measurements.

Even the Berlin Electricity Works, under which he holds appointment, has seen reason to protest against his measurements having been made in one case on an electric lamp which was giving an illumination 79 per cent. below its normal. Moreover, Dr. Bloch ignored the later advances of high-pressure inverted gas lighting; and as only the improved lamps would now be used, it is obvious that his measurements with all their faults are not capable of affording a direct and unobjectionable comparison of the different systems of lighting. For instance, the consumption of gas in the later high-pressure inverted burners has been reduced by 25 per cent., so that the consumption of gas per hour per Hefner mean lower hemispherical illuminating power is no longer 0·65 litre or more, but only 0·48 to 0·50 litre (= about 52½ English candles per cubic foot). In the "Technische Rundschau" of the "Berliner Tageblatt," Dr. Bloch himself has pointed out that in a comparison of means of lighting, the latest advances must always be taken into account.

In regard to the high-pressure inverted gas-lamps, the two-burner columns with a consumption of 2400 litres per hour, referred to by Dr. Bloch as in use in the Königgrätzerstrasse and elsewhere, it should be pointed out that these no longer exist. They have been displaced by three burner lights, which have proved more advantageous. In future, also, only three-flame lights will be employed, even for smaller consumptions. The results given by Dr. Bloch also relate to measurements made on imperfectly regulated lamps, and are too low—indeed, the author has already published some higher results. But as the distances of the columns one from the other were not the same, they are not directly comparable with those of Dr. Bloch. The author, however, has now calculated the illumination from properly-regulated three-flame lights in the same way as Dr. Bloch calculated it for intensifying flame arc lamps from the actual measurements made on such lamps placed at other heights and distances. Thus for columns set 40 metres (131 feet) apart, in a street 120 feet wide, each carrying a lantern 18 feet from the ground with three inverted burners consuming 800 litres (28¼ cubic feet) per hour apiece, the results are as follows :—

—	Drehschmidt.	Bloch.
Maximum horizontal illumination	149·4 lux	123 lux
Minimum " "	3·4 "	1·7 "
Average " "	25·0 "	17·3 "
Consumption per hour per lux per 100 square feet	0·043 cb. ft.	0·062 cb. ft.

The latest three-flame gas-lamps, however, which are being installed show a reduction of 25 per cent. in the gas consumption for the same illuminating power; so that the consumption per lux per 100 square feet has now fallen to 0·032 cubic foot. On Dr. Bloch's own contention, that a system of lighting should be judged by its latest developments, this latter figure must be accepted for comparative purposes. Therefore, high-pressure inverted gas lighting now shows almost half the consumption per lux per 100 square feet of that arrived at by Dr. Bloch, while the uniformity of the illumination at the same time is almost doubled.

The comparisons made by Dr. Bloch of the illumination by different means are unfair, in that streets of various widths have been taken, and a false impression must necessarily be obtained therefrom in regard to uniformity of illumination in particular. Obviously, the illumination is more uniform when the lamps are closer together and the streets are narrow. This stricture applies specially to the electric lighting in the Friedrichstrasse, where the lamps are only 30 metres (98 ft. 6 in.) apart, and the street is 22 metres (72 feet) wide. The gas-lamps in the Potsdamerstrasse and the Königgrätzerstrasse are 40 and 42 metres (131 and 138 feet) apart; and these streets are 36·6 and 28·5 metres (120 ft. and 93 ft. 6 in.) wide respectively.

The main purpose of Dr. Bloch's article was to prove the superiority of electric arc lighting over gas lighting; and in this connection the high-pressure inverted gas-lamps only should be taken into account. The low-pressure incandescent gas-lights formerly used in the Königgrätzerstrasse, which are referred to by Dr. Bloch, should clearly not be regarded. It may, however, be remarked that the gas consumption per lux per 100 square feet with the latest lamps is only about a quarter of that of the earlier ones. There can be no question that the former horizontal illumination of 1·6 lux on the average was inadequate for that street and the Potsdamerstrasse. The Committee of the Municipal Gas-Works recognize that illumination must correspond with the amount of traffic in the street. Consequently, the illumination of the Potsdamerplatz and the square in front of the Brandenburg Gate must not be regarded as a standard to be adopted everywhere, but as adapted to the requirements of the extremely heavy traffic at these two places.

There is no idea of applying this standard to the illumination of less busy squares and streets. Thus, high-pressure inverted gas-lamps, with two burners each consuming 600 litres (21·2 cubic feet) per hour, have been adopted for the Wilhelmstrasse, Kochstrasse, &c. Such improved lighting can only be regarded as suited to the needs of a capital city such as Berlin; and Dr. Bloch is mistaken in regarding it as a dangerous innovation. The same view might be taken as to the lighting by the Berlin Electricity Works of the Friedrichstrasse with Alba-carbon flame-arc lamps. These brilliant lights make the cross streets appear dark; and an improvement in their illumination has been, or must be, effected to render the contrast less strong. It is doubtful whether shopkeepers will be impelled by the better illumination of the streets to increase their use of electric arc lamps, for the reason that they have already employed them freely to attract attention. As to the comments of Dr. Bloch on the disagreeableness to the eyes of modern high-power lighting, it may be observed that the public are now given to comparing favourably the agreeable warm tone of the inverted gas-lights with the electric lamps. But even the present illumination of, *e.g.*, the Potsdamerstrasse is not equal to that of daylight. The life of a capital city, with its immense traffic, at the present day calls for ample, instead of feeble and inadequate, illumination.

It is to be observed that there is no proper relation between the illumination of the different streets, nor is the degree of uniformity of the illumination judged according to any proper standard. The high-pressure inverted gas lighting shows greater uniformity than the low-pressure inverted gas lighting in the Invalidenstrasse, and is as uniform as that of the low-pressure up-turned gas-burners, but less uniform than the lighting by high-pressure up-turned burners. It gives more uniform illumination, however, than that in the Potsdamerplatz, which is lighted by electricity. Dr. Bloch stated that his comparisons of cost were not exhaustive, because he did not know the cost of attendance and renewals for the gas-lamps. Hitherto, also, Dr. Bloch has refrained from giving definite figures as to the similar charges for electric lighting. It will, therefore, be necessary to refer to this matter when making a comparison of electric lighting with gas lighting.

Notwithstanding Dr. Bloch's view as to the great advantage of intensifying flame arc lamps for street lighting, it is noteworthy that the Lighting Committee of Berlin have not heeded the repeated applications of the Berlin Electricity Works for an extension of their employment. They will probably in future only be used in rare instances—such as for the lighting of squares, like that at the Kottbus Gate, where lofty lamp columns may be suitably employed. Dr. Bloch has referred to the "almost pure white" colour of the light of the flame arc lamps with Alba-carbons as being advantageous relatively to the "striking yellow-green" colour of the high-pressure gas-lamps. But the author has observed that from the most diverse directions praise is freely bestowed on the warm and agreeable tone of the high-pressure gas-light as compared with the cold electric arc lamp. The greater penetration of the former in misty and cloudy weather also gives it an advantage over the latter. The feebly reddish tone of colour of the intensifying flame arc lamps has hitherto served to hinder their extension for street lighting. The results given by Dr. Bloch for the light and consumption of current of the Alba-carbon flame arc lamps may easily lead to erroneous deductions, because they refer to the arc without any obstruction beyond that of a clear glass globe. Such arcs are only applicable on the very lofty columns which may be used in open spaces—in streets where shorter columns are necessary, opal globes are essential. The Berlin Electricity Works, indeed, tried these arcs with clear globes on the Gertraudten Bridge; but they proved so brilliant and dazzling that they had soon to be discarded, notwithstanding the representation of the works that the combustion of the carbons would quickly cause a slight obscuring or etching of the clear glass and so reduce the dazzling effect. But a loss of light would have been caused by this obscuring of the glass. Taking Dr. Bloch's figures, it appears that with an opal globe, &c., the consumption per candle is 0·293 watt, against only 0·154 watt for the clear-glass globe. One advantage claimed for the new flame arc lamps—viz., that they are obtainable for medium as well as high-powers—is equally an advantage of the high-pressure inverted gas-lamps, since these are made in various sizes for street lighting.

Dr. Bloch's measurements of the flame-arc (Alba-carbon) electric lighting in Friedrichstrasse were made at the end of June last. They show considerably higher results than measurements made by the laboratory staff of the Corporation gas-works at the end of July. Whether this is due to the opal globes having become etched or further obscured in the intervening month, or to some irregularity of the lamps, need not be discussed. The lamps burnt unsteadily. There were occasional fluctuations in intensity of upwards of 60 per cent., and frequent variations of 10 to 30 per cent. The figures given by Dr. Bloch indicate that the mean horizontal illumination in the Friedrichstrasse with the present lighting is 2·7 times that of the earlier lighting; but according to the gas-works' figures, it is only twice as great. The uniformity of illumination here, of which Dr. Bloch speaks favourably, is simply due to the lamps being close and the street comparatively narrow.

Equally satisfactory results may be shown by the high-pressure inverted gas-lamps used. The charges for attendance and renewal of carbons, however, amount with the Alba-carbon lamps to nearly twice as much as with the earlier electric lamps—viz., £14 per lamp per annum, against £7 10s. Taking the current at only 1½d. per B.T.U., and the consumption per lamp at 8·25 watts per hour, the cost of current per lamp per hour is very nearly 1¼d. The attendance and the renewal charges, with lamps burning all night long (3675 hours), amount per hour to 0·91d. with the Alba-carbon lamps, and 0·49d. with the old arc lamps. Hence the total cost per lamp per hour is 2·15d. with the former, and 1·73d. with the latter. Granting that the mean horizontal illumination is doubled by the use of the Alba-carbon lamps, the total cost of lighting by them is 62 per cent. of that of the old ordinary arc lamps on the basis of equal illumination. From this comparison, we may pass on to compare the cost of illumination by the flame arc lamps with that by the high-pressure inverted gas-lamps.

(To be continued.)

ECONOMIZING IN GAS-WORKS.

At the recent Meeting of the Managers of the Childs, Hulsnit, and Co.'s gas and electric properties, they had before them a paper, prepared by Mr. A. F. Traver, of Chattanooga (Tenn.), dealing with this subject. The author explained that he did not purpose going into any elaborate discussion of the question of exercising economy on the works, but would simply call attention to a few apparently unimportant details, proper regard for which might, he thought, result in lower working expenses. The following are some extracts from the paper.

The gas business, and in particular the works' end of it, probably presents greater opportunities for waste than any other, on account of the continuity of operation and the peculiar conditions under which it is necessary to work. Further, the efficiency of this operation is almost entirely dependent on the attention given to details. The old maxim, "Take care of the pence and the pounds will take care of themselves," applies very strongly to this business. The conditions under which different works are compelled to operate require different methods of procedure to secure the best results; and, on account of the peculiar local circumstances, it is impossible to lay down any hard-and-fast rules which will generally apply. While there are many methods and schemes which in one works produce the maximum operating efficiency, the same methods applied in another works might tend to produce just the opposite effect, due to some peculiar conditions which do not exist in the first works. The man in charge of a plant must be able not only to study new schemes and devices for accomplishing his ends, but also to judge accurately the effect that would be produced if the schemes used in some other works were applied to his own, and possibly change these slightly to make them conform to his conditions. On this account, I think we may safely say that the first requisite to the best efficiency in works' operation in any plant is that the man in charge should have brains; second, that he should use them.

Handling Raw Materials.—In most works it is customary to unload coal from the cars on to the stack and take coal as it is used in the retort-house from the stack. In the majority of cases it is possible to arrange this unloading so that the stokers or coal porters unload the coal direct from the cars. This will result in a saving on the original cost of unloading, and have the advantage of saving the coal from the breaking-up effect of a double handling. It is ordinarily just as easy for the men to take the coal from the cars as it is to do so from the stack, and therefore it does not entail any additional work on their part. Theoretically, maximum efficiency in this direction is attained when the coal arrives at the same rate at which it is being used.

In practice this is, of course, impossible, but, by carefully watching the theoretical results, it can be at least approximated; and the savings in the course of a year will be surprising.

Coal stacked once should never be touched except in cases of great necessity, as it is very expensive to trim coal and keep the pile in shape. If it is necessary to cut into the stack, arrange to do it at a point where fresh coal can be easiest stacked again when the regular coal shipments are resumed. The old theory that it is policy to work over a coal-stack once every year or so has long since been exploded, and the maximum results can be obtained if the fresh coal is always used for carbonizing.

Oil.—The handling cost of oil, whether it is unloaded by gravity or is to be pumped, is so small as to be almost negligible. It is well, however, to arrange to have the unloading pipe permanent, with the exception of the connections at the car, and to have these connections arranged so that the men can connect the car to the receiving lines with the least work.

Retort-House Operation.—The question of bench economy, so far as fuel saving and adjustments of the bench are concerned, have been thoroughly thrashed out in papers read before the different Associations; and I will do no more than refer these to you for consideration.

The proper arrangement of the work of the stokers, coal porters, coke handlers, &c., is governed almost entirely by local conditions, and the most efficient method must be worked out on the ground. In considering this point, it is well to remember that the only real skilled work in the house is that of charging the retorts; common labour can be used for all other work. For this reason, it is best to arrange the work so that one set of men may do the charging exclusively; labourers doing the rest of the work. In the operation of drawing and charging the retorts, it is advisable to have the doors open the minimum half of time.

Retort-house tools should always be in the best repair, and a number of extra tools kept on hand in a convenient place for use in case of breakage. No rake, clinkering-bar, or other tool should be allowed to be used after it has once begun to show colour, for they deteriorate rapidly at this point. To save time and cost in case of stoppage, all off-takes from the foul mains should be tapped every few feet and plugged; a steam line, with openings near these taps, should be provided; and steam-hose hung up in some convenient place so that these two lines can be quickly connected in case of stoppages and the gas-lines cleared. It is always policy to arrange to have a set of wrenches, steam-hose, and connections ready for use at instant notice in every room where there is any probability of stoppages.

The proper lighting of a retort-house is a question that deserves more attention than it usually receives. Most retort-houses are lighted by a number of flat-flame burners located on the side walls, 6 or 7 feet from the floor. These lights burn a great deal of gas, and even then do not accomplish the required end. A few outside gas arcs, hung in about the centre of the space between the benches and walls at such a height as to light the top of the bench, would replace a great number of these small burners, and would light the retort-house much more cheaply and efficiently. The men about gas-works are usually extravagant in the use of gas, and they should be watched very closely to see that they turn out the lights when they are not in use.

In most works a considerable amount of good coke is in the ash and clinkers which come from the benches; and these are thrown away on the pile. By arranging a small portable screen so that the ashes as they come from the house are dumped over it, will enable the operator to save a considerable amount of this coke, as the good coke will roll to the outside of the pile and can be picked up quite rapidly. Ashes and the clinkers from the water-gas apparatus should also be treated in the same manner. In cases where the dump pile is at some distance from the retort-house, the expense of hauling the ashes to the dump can be greatly reduced by the installation of a small elevated bin near the retort-house, into which the men can dump their ashes. The coke carter, with his waggon, can empty this bin during some of his spare moments.

The question of the most economical yield is another of the subjects which have been considered by the different Associations; and they have not been able to come to any definite conclusions thereon. It is, however, a question of very great importance, and one to which proper attention has not been given, as the greatest yield has been the standard by which heretofore the operators have been judged.

Exhauster, Condenser, and Scrubber Operation.—The working of an exhauster, after the adjustments have been made, presents very little opportunity for saving. One of the most important points about the operation is to see that the pulsations are not excessive, so that the retorts are one moment under heavy pressure and the next under vacuum. This is likely to be the case when the capacity of the exhauster is considerably in excess of the demands made upon it. In this case it will run at a low speed, and the pressure of gas on the retorts will fluctuate violently. The remedy for this is to open the valve slightly, and allow some of the gas to be bye-passed, which will speed-up the exhauster, and bring the vibrations down to normal. The effect of this fluctuation on the quality of the gas is very marked; and care should be taken to see that the pressure conditions are as nearly constant as possible. Too little attention is often given to the amount of water used in the condensers, especially when the temperature of the cooling water is high and very near the outlet temperature of the gas. When these approximate each other, a great deal of water can be forced through the condenser without appreciable effect; thus increasing a water bill without getting any return.

The overflow water from the condensers is very often allowed to run into the sewers. This can be utilized in many ways about the works, either for quenching coke, in the boilers, or in the gas-holder tank. A good way to employ this water is to put it into the feed-water heater, and use it for supplying the boilers.

The fresh water used in the scrubber should be limited to the smallest amount that will accomplish the desired result. It should not be the aim in scrubbing operations to take all the ammonia out of the gas. A large excess of water is required to remove the last traces; and the ammonia thus saved will seldom pay the extra concentrating costs. In addition to this, the small amount of ammonia going forward into the purifiers greatly increases the active life of the oxide, which, to do the best work, must at all times be alkaline. The decrease in purifying costs will more than compensate for the loss of this small amount of ammonia.

Purification.—Probably the greatest saving in purifying operations can be effected by the introduction of a small quantity of air into the gas. This revivifies the oxide in the foul boxes; and by reversing their order from time to time, a considerable saving in the cost of handling can be accomplished. In most cases 2 per cent. of air can be thus admitted without affecting the quality of the gas. Waggons or buggies for handling oxide during the changing should be as large as the men can conveniently deal with. More time is usually consumed in going from the box to the pile and back than is used in filling the waggons. By increasing the quantity carried each journey, the loss per bushel of oxide can be materially reduced. Many little devices for increasing the efficiency of the men while working in the boxes can be installed cheaply, and will sometimes pay for themselves in the first change necessary.

Holders.—The working of the gasholder presents but few opportunities for effecting any saving, with the exception of the steam for heating the cups and tanks. The object towards which we are striving in heating these is to keep the water at these places just above the freezing-point. It is the writer's opinion, however, that in nine out of ten of the holders examined throughout America during the winter, this water will be found more nearly at the boiling than the freezing point, thus entailing an enormous waste on account of the excessive steam consumption. The remedy for this is obvious. Many devices and "wrinkles" have been worked out for economically heating gasholders; and a description of these will be found in the "Wrinkle" departments of the various Associations.*

The painting of a holder is another point which requires careful consideration; the object being to protect the metal from the corrosive action of the liquor always present on the top of the tank water. From experiments made by the writer, it has been found that red lead with boiled linseed oil is the only paint which will successfully withstand this action; and he would recommend that red lead should be always used as the priming coat. On account of this corroding action, all paint will become mottled and dirty looking, so that the holders will require painting once each year or two for the sake of appearances. Almost any paint can be used for this purpose after a good priming coat of red lead has been put on.

Boiler Operation.—Steam forms one of the most important items in the cost of operating gas-works. As far as the actual boiler practice is concerned, this has been covered in papers read before the different Gas and Engineers' Associations, and therefore will not be reviewed here. Probably the most important saving on gas-works lies in the ability to use breeze for fuel. If the boilers are not working under an overload or near their rated capacity, the burning of breeze is comparatively simple; but as the load on the boiler increases, this becomes more and more difficult. By the use of forced or induced draught on the plant, this can be accomplished in all cases, except possibly just after the fires have been cleaned out, at which time some coal may be needed. The necessity for having leaks properly repaired is obvious.

Tools.—Most operatives labour under the delusion that the fewer tools there are about a works the better, on account of the high first cost. They will often allow a man to spend more time looking for tools than it takes him to do the job. It is the writer's opinion that the more tools about a gas-works the better, provided they are looked after carefully, and not allowed to be lost. The importance of good tools and plenty of them cannot be overestimated.

General.—Keeping the works and buildings in the very cleanest condition at all times is one of the most important factors leading towards low costs. It may seem foolish to say that a clean yard or office will reduce the retort-house expenses; but it is nevertheless true. No man enjoys working in a dirty place. A small amount of effort and money spent in keeping the works clean will be amply repaid by its effect on the spirits of the men; and every facility should be given them, in the way of providing brushes, combs, books, and extra help, if necessary, to accomplish this.

* An article dealing with this subject appeared in the "JOURNAL" as recently as Nov. 17 last (p. 495).—ED. J.G.L.

Mr. W. H. Rothwell, who, as announced last week, has resigned the secretaryship of the Ashton-under-Lyne, Stalybridge, and Dukinfield Joint Water Board, is retained by the Board as consultant-adviser. He has been Secretary since 1878.

SCOTTISH JUNIOR (WESTERN) ASSOCIATION.

Visit to the Dawsholm Gas-Works.

About seventy members of the Scottish Junior Gas Association (Western District) paid a visit on Saturday to the Dawsholm Gas-Works of the Glasgow Corporation, which are reputed to be the largest in the United Kingdom outside of London. The visitors were met at the gate by Mr. Alex. Wilson, the Engineer, and Mr. A. M. MacLeod, the Station Manager. Mr. Wilson having expressed his pleasure at seeing so large a gathering, said that Mr. MacLeod was their host, and would show them over the works. This was done by Mr. MacLeod and his Assistants.

The works at Dawsholm, it may be mentioned, were laid down by the Corporation of Glasgow immediately after the gas undertaking was acquired by them in 1869, to plans prepared by the late Mr. William Foulis. In 1890, the Temple Farm works of the Partick, Hillhead, and Maryhill Gas Company adjoining were acquired by the Corporation, and were added to Dawsholm, but are now disused as a gas-making station. The capacity of the works is equal to a daily output of 20 million cubic feet; and 16 million cubic feet have been sent from them in the course of a winter day. By way of comparison, it may be stated that at the new gas-works of the Corporation at Provan the provision as yet made is for a daily output of 12 million cubic feet, though the site is capable of providing for 48 million cubic feet per day.

In all the gas-works of the Glasgow Corporation the retorts are 9 feet long, by 21 in. by 15 in., Ω-shaped, and set back to back. In the Dawsholm station there are 2128 retorts. These are divided into three sections or houses—No. 1, the old house, in which there are 832 retorts in settings of eights, fired on the Siemens, or hot regenerative, system; No. 2, which contains 576 retorts, in settings of nines, fired upon an internal producer system introduced by Mr. Foulis, and which has been previously described; and No. 3, in which there are settings of twelves, fired partly by internal producers, and partly by gaseous firing derived from outside producers. In all, 256 retorts are heated by outside producers. The latter are found to give fully as good a heat as, if not better heat than, either of the other two systems. Three-hour charges are run with the eights, and four-hour charges with the others. The works are equipped throughout with the Arrol-Foulis charging and discharging machinery, operated by hydraulic power. Each machine works 48 retorts; and the time occupied in covering these is 25 minutes. The outside producers number six, and are equal to producing gas for the heating of 360 retorts.

There is storage capacity in the works for 40,000 tons of coal—equal to about five weeks' supply. It is all brought in by a high-level railway. Formerly the coal was shovelled from the railway waggons into the stores alongside the retort-benches. In the later additions to the retort-houses, including the coal breakers, elevators, and conveyors, the coal-stores have been placed at one end of the house, and arrangements have been made for the coal-waggons being brought forward and tipped by means of hydraulic power. After passing through the breakers, part of the coal is raised by an elevator to a storage hopper which serves the half of the retort-bench nearest to the breakers. The other part is carried by a horizontal chain and bucket conveyor along the retort-house wall, and is there elevated to a storage hopper which supplies the charging-machines serving the further half of the retort-bench.

The condensers are an extensive range of 520 tubes, 12 inches in diameter and 36 feet in height. There are two exhauster-houses. In one there are eight drums, each capable of passing 200,000 cubic feet of gas per hour; and in the other there are three drums, two of 200,000 cubic feet, and the other—a Donkin apparatus, and the first of its kind to be put down in Glasgow—of 120,000 cubic feet capacity. The washing and scrubbing are done by plant supplied by Messrs. C. & W. Walker and Messrs. W. C. Holmes and Co. In the plant of the latter firm, all the scrubbing is performed by a solution of ferrous carbonate with soda ash added, to form ferrous cyanide. There are eight station-meters, by Messrs. Milne and Messrs. Laidlaw, each of an hourly capacity of 100,000 cubic feet. The purification is by lime, all obtained from Ireland, and burnt in the works, in five kilns which are capable of treating 50 tons of stone per 24 hours. There are six sets of purifier-boxes, 30 ft. by 25 ft. The spent lime is readily purchased by farmers at 6d. per ton. For providing hydraulic power, there are three condensing pumps, of 70, 40, and 30 H.P. respectively.

The visitors saw these portions of the works, and the cyanide recovery plant, as well as the workshops. The Temple Farm works, and the works for the recovery of sulphate of ammonia, which are let, were not visited.

At the conclusion of the walk round, tea was served.

The PRESIDENT (Mr. A. H. Whitelaw, of Glasgow) proposed a vote of thanks to the Corporation of Glasgow, Mr. Wilson, Mr. MacLeod, and his assistants, for the pleasant afternoon they had given them. They had had a splendid visit to Dawsholm—the largest gas-works in Scotland, and a works which were fully up-to-date. Everything there was giving satisfaction. As an Association, they appreciated the opportunities they had from time to time of visiting works, because in doing so they got their ideas broadened. Those who were in large works liked to go to small ones; and those who were in small works liked to go to Dawsholm or Provan, to see how things were done there. They had received a lot of information from Mr. MacLeod and his Assistants, which would be of service to them.

Mr. MACLEOD (who presided) returned thanks. He said he looked upon it as a high honour indeed to have an Association such as theirs visiting Dawsholm. They found them busily engaged in their winter work. They had not as yet put off a single retort.

Mr. A. WILSON said he came there as a visitor, along with the other members of the Association. He asked Mr. MacLeod to make all the arrangements; and he had done so. As they were going round, Mr. MacLeod would doubtless have been able to give them all the necessary explanations to enable them to thoroughly understand the working of the plant. This was one of the great benefits of their Junior Association. The Dawsholm works had grown up by degrees. It was a very fine place for educating young men, because there were so many different systems in the works. When the works were started, there were ovens of three retorts. Those were afterwards increased to fives, which was a long step in advance. The settings were afterwards increased to eights. But the demand for gas in Glasgow increased so rapidly that they had to face extensions; and shortly after he went there, No. 2 retort-house was erected, and then No. 3 was built, in which there were settings of twelves. The demand for gas still increasing, they started upon Provan. This was the last works which Mr. Foulis designed, and which he (Mr. Wilson) had the honour of completing for the Corporation.

COAL AND COKE HANDLING PLANT.

Before the Ipswich Engineering Society last Thursday, Mr. B. H. Burroughes, of the Gaslight and Coke Company, read a paper on the "Handling of Coal and Coke on a Gas-Works."

The author remarked that on large gas-works the amount of coal to be carbonized and the coke produced was so great that special attention had been directed to various labour-saving appliances. Taking, for example, the Gaslight and Coke Company's works at Beckton, he said that there 603,000 tons of coal were received in six months, of which 456,000 tons were dealt with on the works—the remainder being sent in barges to the Company's up-town stations. The steamers were unloaded by means of grabs worked by hydraulic cranes. Each grab held a ton, and each crane raised 50 tons per hour. In the larger ships having four holds, 200 tons were unloaded in an hour. The grabs discharged through funnels into iron trucks holding 5 tons each; and each truck as filled was hauled over a weighbridge, and then away to form part of a train, which, when made up, was taken by a locomotive along the overhead railway to the retort-house, where the coal was shot into bunkers. There were no fewer than 31 locomotives on the works for the purpose of drawing the trains; and 29 of the engines were at work in the winter, when about 4000 tons of coal were carbonized per day. A different way of taking coal from barges was by means of a crane and grab; the coal being dropped into a hopper which fed the coal breaker and elevator. Another way was for the coal to be raised by grabs working in pairs, and being raised above an overhead railway. When at the top, a moveable hopper was run under them, into which the coal was discharged. After the coal had been stored in the retort-house, it had to be raised to the top of the retort-benches into hoppers, which fed the charging-machines; and this was done by means of elevators of various types.

Mr. Burroughes described the different elevators, and also devoted some attention to conveyors. He gave a description of the charging-machines; and then dealt with the removal of the coke. He said that, on account of the quantity of coke to be dealt with, and the distance to be covered, hot-coke conveyors were out of the question at the Beckton works. He explained, however, the various types of coke-conveyors, and pointed out that where the coke had to be taken a long way to be loaded into vans or barges, the system of conveyors, applied to the whole distance, was a doubtful advantage, owing to the large amount of wear and tear. The best idea was to bring the coke to hoppers, under which trains could be run, and the coke be taken any distance at very small cost.

In the course of the discussion on the paper, Mr. Frank Prentice gave an account of his own experiences with various kinds of labour-saving contrivances at the Ipswich Gas-Works, and said that he had in use a steel-plate conveyor, 1 foot in width and 320 feet long, which had passed 150,000 tons of coal, and was practically as good as when it started. He had another which had passed 340,000 tons of coal, and all they had had to do to it was to occasionally renew some of the plates.

Recent Wills.—Mr. Thornton Andrews, who died on the 14th ult., aged 73, left estate of the gross value of £10,187, with net personalty of £7563. The late Sir Ralph Littler, C.B., K.C., Chairman of the Middlesex Quarter Sessions and of the Southgate and District Gas Company, and a Director of Messrs. Head, Wrightson, and Co., Limited, who died on the 23rd of November last, aged 73 years, left estate of the gross value of £29,827 5s. 8d. with net personalty *nil*.

PURIFICATION OF WATER BY OZONE.

At a Meeting of the Royal Sanitary Institute on the 13th inst., under the presidency of Mr. E. B. Barnard, M.P., the Chairman of the Metropolitan Water Board, Dr. S. RIDEAL, F.I.C., read a paper on the above subject.

The author commenced by remarking that ozone is the ideal agent for purifying water, since it leaves behind it only ordinary oxygen, and nothing which is foreign to the water. He then referred to the experiments of Fröhlich and Ohmüller, and subsequent bacterial reports on Tindal's apparatus by Van Ermengem, Marmier, and Roux. Last September and October he examined in detail the working of the De Fries installation for the sterilization of water by ozone at the St. Maur Water-Works in Paris. These works furnish a large portion of the water supply of the city. It is drawn from the River Marne, which receives a considerable amount of sewage pollution above the intake. At the time of his visit the river was quite full, with a sluggish flow; the water was greenish brown, slightly turbid, and contained large numbers of aquatic organisms. At the works for the ordinary supply the water was pumped into sedimentation reservoirs, and then drawn off and filtered through gravel and sand. His bacterial and chemical investigations showed that reliance on filtration alone was attended with constant danger from pathogenic bacteria; and sterilization, as far as it could be practically effected, was an urgent need. For this purpose, ozone had always seemed a most suitable and natural agent, for two chief reasons: (1) It is only a more active form of ordinary oxygen, already existing normally in small quantities in the atmosphere, and continually assisting in natural oxidations; (2) it does not add to the water the residue of any chemical, and in doing its work of purification it is simply resolved into ordinary oxygen, which dissolves in the water and adds slightly to its aeration.

Dr. Rideal proceeded to describe the plant in operation at St. Maur. It consists of an efficient arrangement for the production of ozonized air and for its intimate admixture with the water. The current is generated by means of a 45-H.P. steam-engine, and a Mordey alternator of 110 volts, charged by a transformer to a higher tension. The ozonizers are of the Siemens-Halske type, placed in a dark, cool room. The electrical energy required for the production of the ozone during the experiments averaged 1·31 kilowatts per 104 cubic metres of water sterilized, or equal to 57 Board of Trade units per million gallons. But the energy required for compression must be added to the cost, thus giving a total of 133 units per million gallons. M. Colmet Daage, the Chief Engineer to the Paris Municipality, estimated that the cost worked out at about $\frac{1}{3}$d. per 1000 gallons, excluding interest, amortization, and repairs. Dr. Rideal said he took special care that the samples collected for analysis should be fair and representative; but the course of the inquiry involved a number of chemical and physical questions which he was able to satisfactorily elucidate. His observations as to temperature proved that the water under treatment, instead of being heated, was cooled to a slight extent, and that the cooling arrangements in the plant worked efficiently. He found that no metallic contamination of the water resulted from any corrosion of the apparatus by ozone, or that there were any traces of oxides of nitrogen, chlorine compounds, or peroxide of hydrogen formed in the process. Its physical characters were greatly improved, and the organic matter was considerably reduced. Of the ozone absorbed, he found nearly 73 per cent. was immediately utilized in purification, 7 per cent. was renewed (dissolved in the water, and might effect a further improvement), while about 20 per cent. passed off with the air current. This proved that the De Fries cycle, in which the residual ozone was used again, was essential for economy. The results of the bacteriological examination proved, as a general conclusion, that the ozone treatment destroyed all but the more resistent spore forms of bacteria present in the filtered water, *coli* and allied intestinal organisms were entirely eliminated, and subsequent contamination being excluded, there was no recrudescence of this class of organism.

The author proceeded to compare the relative circumstances existing in Paris and London, where the water supply is drawn from rivers and wells; his remarks being as follows: The amount of purification which a sand filter is capable of ensuring depends upon the original purity of the river water to be treated; and as in both cases the rivers have been getting more and more contaminated with the growth of the upper riparian populations, it has been found that this purification does not now result in a water which is equal to the standard of deep-well supplies, and consequently there is no method of ensuring a given purity without largely augmenting the number of existing filter-beds and at the same time maintaining very efficient bacterial control. Thus in London at the present time the Water Board have 160 filter-beds, the greater number of which are in constant operation; and despite the very large number of samples examined day by day at the laboratories, water is constantly passing into public supply the quality of which has not been bacterially determined. In Paris, it has been proposed to safeguard the purity of the water by an ozone treatment after the existing sand filtration; while in London during the last few years the Water Board have proposed to adopt storage of the crude river water for a length of time sufficient to ensure the destruction of all, or nearly all, the typhoid bacilli, and so prepare a water by this "safety change" that the existing filter-beds will continue to do satisfactory work. So much is this the case, that the advisers of the Board are of opinion that a well-stored rapidly-filtered water is likely to be safer than an unstored slowly-filtered water. From the work already done in this direction, it would appear that in London the average impurity of the present raw river waters is of such a character that no less than two months of storage would be necessary in order to ensure the death of all typhoid bacilli; and, as a compromise, it is suggested that provision should be made for a four weeks' storage before filtration. It is obvious that the length of time to improve the quality of the water up to this safety standard is greater than the number of days which are necessary to ensure a sufficiency of quantity; and Dr. Houston, in his report, specially points out that, after having provided a storage capacity of four weeks, a slow rate of filtration should still be maintained at the existing filter-works. So that no economy in the cost of filtration as ordinarily practised is to be expected, at any rate till after the new *régime* has had sufficient trials.

It would seem, therefore, if the conclusions of Dr. Houston are correct, that the proposal to increase the storage of the river water to four weeks must be accompanied by an increase of the number and area of the filter-beds, if the rate of filtration is still to be maintained as at present. In order to ensure the storage of all the water supplied to London, it is necessary to recollect that this amount can only be taken from the Thames and Lea in the absence of both high flood and of drought; and consequently the existing storage reservoirs, at present holding nearly forty times the daily average supply, will not only require rearrangement, but also suitable additional works, before they can fulfil the conditions laid down. Hence the subject resolves itself into an engineering problem, and an inquiry whether the outlay on these additional works will secure the same quality as an ozone treatment of the existing water as it leaves the filters. Under the ozone treatment, an immediate chemical test gives the safety factor which is required for successful working in such a way that no doubt can be raised as to the purity of the water; but, on the other hand, by the present dependence on storage and filtration, although the safety change may be assumed to take place in the proposed reservoirs, the uncertainty of the quality of the water on leaving the filter-beds still remains. All towns with a river-water supply have at present conditions similar to those of Paris and London; and the reasons for an ozone treatment therefore seem applicable. Many other places whose conditions of supply involve drawing on wells which may be subject to occasional or periodical pollution could by this treatment ensure a guaranteed purity.

Discussion.

Professor H. ROBINSON, while congratulating the author on his careful and valuable investigations, considered that he had drawn certain conclusions without appreciating the different conditions obtained with respect to the London water. The water drawn from the Thames was very different from that taken from the rivers in France. Further, it was not only a question of quality but of quantity also; and they knew that by the storage of water in large reservoirs injurious bacilli were destroyed by harmless ones. He was, however, inclined to think that in the future a much greater use of ozonizing processes would be made than had been done in the past, though he did not wish it to be understood that he agreed with the author in all his conclusions.

Colonel DAVIS said he had read the discussion which took place at the Berlin congress on the ozonizing process, and noticed that it was stated that it was only applicable to clear water. It was urged, however, that for successful working there must be continuous inspection by a responsible engineer; that the apparatus must work without interruption; and that frequent bacteriological examinations should be made. He was sorry such minute supervision was required, as he should like some apparatus or process which would almost work by itself. One observer stated, however, that at Paderborn an installation had been running for two years under the supervision of an ordinary labourer, and that it gave good results, reducing the germs by 100 or 98 per cent., which was as much as they could wish for.

Mr. A. J. MARTIN said the author had given them the cost of working, but had not submitted any figures as to the annual cost of plant with reference to the quantity of water with which it was capable of dealing. Apparently the amount of ozone utilized depended upon the chemical quality of the water; and he should like to know whether, in the case of London, the amount of ozone required per million gallons, and the cost of making the ozone, would be proportionately less than in the case of the Paris water. Further, would the author in any case regard the ozonizing process as taking the place of sand filtration where there was an initially good water; and, assuming that sterilizing by ozone was too costly a matter to be permanently used in connection with the supply of London or any other large town, was the apparatus of such a nature that it could readily be installed for emergency treatment in case of infective pollution of the water?

Dr. NASH (Medical Officer of Health for Norfolk) remarked on the wonderful improvement in the water as shown by the author's figures; but he said he would like to know how long the water had passed through the apparatus before it was bacterially examined.

Dr. RIDEAL said it was almost immediately after.

Dr. NASH thought it would be well if tests were made of the water at a later period.

Mr. EASTON DEVONSHIRE said the water at St. Maur was not

used as a bulk supply to Paris, but the filters were employed for experimental purposes. People were flooded with percentages as to the results of different processes; and, as a water engineer, he thought the conditions of analyses should be standardized. With regard to water treated in the way described, it would be interesting to know what happened after it had been through a long length of pipe. Though complaints were made, they certainly took much greater care of their rivers in England than was the case in France; and they had been able to supply water which was healthy and drinkable, with more or less carelessness, perhaps, in the filtration. In Paris, the original water supply was from springs, which had been the cause in recent years of typhoid epidemics. There was, however, a prejudice against filtered river water; but the engineers desired to have as a stand-by some water which they could deliver.

Mr. W. J. DIBDIN remarked, with reference to the statement that water was constantly passing into consumption in London without bacterial examination, that it was, of course, impossible to examine all the water, and the samples must be taken as representative. Dr. Houston had pointed out that, after the most careful inquiry possible, he had been unable to isolate a real typhoid organism.

Mr. SHENTON said, as a water engineer, he must admit an unwillingness on the part of the members of the profession to take up new processes; and this was perhaps somewhat due to the fact that the inventor of a process might come to grief and leave the engineer to look after the apparatus.

The CHAIRMAN said he quite appreciated that the ozone process might be of great advantage in an emergency; but he did not think the water supply of London could be compared in any way with that of Paris. Purification by ozone might be a most desirable process; but the question of cost must come in. Taking the author's own figure, the adoption of the system would mean £90,000 a year for London; and this included only the costs of which the author knew.

Dr. RIDEAL, in reply, said that, as he was not an engineer, he could not answer Mr. Martin's first question. The quantity of ozone required for dealing with the London water would be less than that used at St. Maur. It was practicable to replace sand filtration entirely by ozone purification where the organic matter in the raw material was very small; and it was possible to employ ozone as an emergency process. He agreed with Mr. Devonshire that it was impossible to compare some of the figures put forward by French observers, as the methods of English and American workers were entirely different. The point he had ventured to make was not whether the ozone process was going to entail an outlay of an additional £90,000, but whether the cost, whatever it was, was greater, less, or equal to that which was at present being, and would hereafter be, incurred by the Water Board in the enlargement and construction of storage reservoirs and filters for maintaining the present standard. This was a point on which nothing had been said in the discussion.

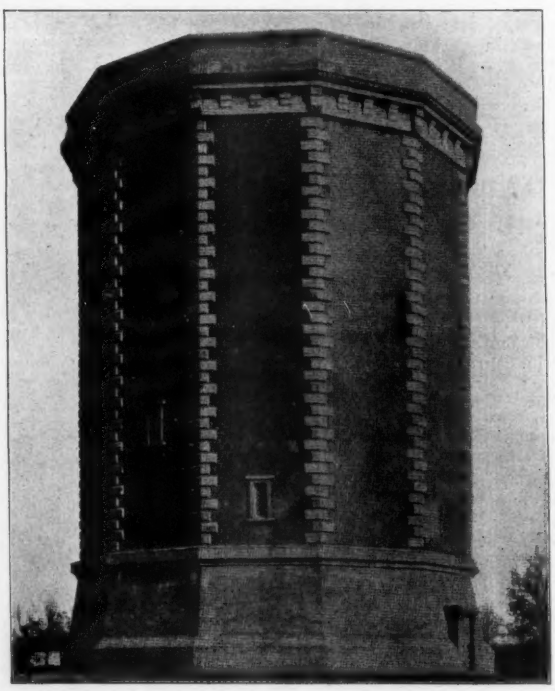
A STEEL AND CONCRETE WATER-TOWER.

As a part of the improvements to the distribution system of the municipal water-works at Grand Rapids (Mich.), an 885,000-gallon water-tower has been erected at a point about four miles from the pumping-station. It acts as a pressure equalizer, and also holds a reserve supply for the section of the city adjacent to it. One pipe serves both as an inlet and an outlet; so the water enters the tank during the low demand, and is drawn from it when the quantity required exceeds the capacity of the mains feeding the section. The tank occupies a prominent site in a residential district, at an elevation somewhat above that of the city. On account of the location and the prominence of the site, it was specially desirable to erect a structure that would not interfere with the landscape. The distance from the pumping-station, and the fact that the tank was to be supplied by a main which is part of the distributing system, made it necessary that it should be protected from the frost, on account of the great fluctuation in the height of the water, which would necessarily take place, causing danger of failure due to falling ice. The conclusion was accordingly arrived at to construct a reinforced concrete tower, enclosed by a shell of this material properly treated to be in keeping with the surroundings. Failure to secure satisfactory proposals for building a tower of this type, however, led to the design of a steel tank mounted on a low reinforced concrete base, and enclosed by a casing tower of reinforced concrete. Favourable tenders for the execution of the design were received, with the result that the combination tower was built. The appearance secured is shown by the accompanying reproduction of a photograph of the completed structure, taken, with the following particulars, from a recent number of "Engineering Record."

The steel tank, 50 feet in diameter and 60 feet high, stands on a substructure consisting of a reinforced concrete floor on concrete columns, 24 feet long, resting on a foundation of reinforced concrete inverted groined arches. This foundation is carried down 7 feet below the surface of the ground, and is shaped in plan as a twelve-sided polygon, having an enclosing circle 67 ft. 10 in. in diameter. The arches have a clear span of 5 feet, are 24 inches thick at the columns, and 12 inches thick at the crown. The footings spread the weight of the structure over the entire base, so as to give a loading of 4300 lbs. per square foot on the soil, which is a clean, sharp sand. On this footing is erected a series of reinforced columns to carry the tank. Twelve are spaced round the circle described by the sides of the tank; one being placed at each angle of the enclosed twelve-sided polygon. The interior of the polygon is occupied by columns on regular transverse and longitudinal rows spaced 7 feet apart on centres in both directions. The columns are connected by beams and girders; thus forming the supporting system of a 12-inch reinforced concrete floor on which the tank stands.

Round the tank is a twelve-sided curtain wall of reinforced concrete, 4 inches thick, carried by a separate series of twelve columns placed round the outside edge of the twelve-sided footing which also carries the tank columns. The columns from the base up to the lower annular girder, which is located on a level with the floor supporting the tank, are heavy, and are well braced to the inner columns by concrete struts. They are not reinforced; but above the lower annular girder they are reinforced.

The curtain wall between the footing and the lower annular girder is shaped to give the appearance of the footing that of a monolithic structure, in order to secure the proper exterior effect. Above the lower annular girder the curtain wall has two staggered rows of blocks cast at each intersection of its twelve sides as a part of the architectural treatment. The curtain wall is divided on the inside into four storeys, by a frame of intermediate annular girders connected at the intersection of the sides by columns. Surmounting the curtain wall is a heavy annular girder, cast monolithically with a cornice and a parapet wall, designed to distribute the thrust of the dome. The cornice and parapet wall



General Appearance of the Grand Rapids Water Tower.

are detailed so as to give the proper proportions to the structure as a whole, and largely to conceal the appearance of the smooth flat top of the dome. The latter has a span of 57 feet and a rise of 10 feet. It is 4 inches thick at the crown, and 6 inches at the springing line; the reinforcement consisting of No. 10 expanded metal.

The connection between the tank and distribution systems is a 16-inch pipe carried through the footing, and laid on the bottom slab of the latter to near the centre of the tank. At this point the pipe is turned up and extended to an open end in the bottom of the tank. This pipe is controlled by a hand-operated gate-valve. A space 7 ft. by 14 ft. in plan between two rows of columns and the riser of the pipe is enclosed by 4-inch walls, and the riser of an 8-inch washout-pipe is also placed in this enclosure. This pipe leads to a drain, to which is also connected a 12-inch overflow placed in the space between the steel tank and the curtain wall.

The entrance to the space under the tank and that between the latter and the curtain wall is obtained through a door on one side of the base. A winding stairway leads from this door round the tank up to a hatch in the dome of the shell, to provide access to the top of the tower. This stairway is of reinforced concrete, and above the floor on which the steel tank stands it is carried by brackets cantilevered out from the columns of the framework of the curtain wall.

In building the tower, Mr. J. P. Rusche, the general contractor, of Grand Rapids, installed plant and employed methods specially adapted to the somewhat unusual construction conditions to be

met. The concrete was made in a Smith mixer, set up adjacent to the footing, and all concrete in the footing, up to and including the floor for supporting the steel tank, was placed with the aid of a derrick. The footing was completed in September, 1907, and the erection of the steel tank began about the 1st of December. The next spring the work on the casing tower was started. A timber falsework, consisting of two circular rows of poles, 80 feet long, and well braced together, was built up to the full height of the tower, in order that the concrete work above the footing might be handled advantageously. A double-cage hoist was erected in connection with this falsework to deliver the concrete and forms at different elevations as the height of the wall increased. Runways were built in the falsework from the hoist around the tower, and the concrete delivered in wheelbarrows operating on these runways from the hoists.

The forms for the curtain walls were all built up in sections 4 ft. 6 in. wide and 16 feet long, corresponding in length to the width of the sides of the curtain wall. These forms were entirely independent of the falsework, being braced from, and wired to, the steel tank by means of steel bands, made up of turnbuckles and ½-inch round rods that encircled the tanks. This arrangement gave a very rigid construction; no jar being transferred to the forms by the men working on the scaffold or by wheeling material on the latter. The work was carried up in the manner that is usually followed in building circular concrete grain-elevator tanks, by removing the lower sections after the concrete has set, and placing them higher up. Following this method, enough forms for a height of 13 ft. 6 in., extending round the tank, were all that were required.

The concrete was poured, to a depth of 4 ft. 6 in. at a time, entirely round the wall, and special provisions were made to avoid joints whenever the placing of the concrete was interrupted. The blocks at the intersections of the sides were cast at the same time as the main portion of the wall, by building offsets in the forms to shape them. The cornice and upper annular girder were cast simultaneously, in order to secure uniformity of appearance. The dome was cast in forms built upon a centering of wooden trusses erected on the steel tank, and the concrete in it was all placed without stopping.

Three grades of concrete were employed: (1) For foundations, columns, and other work more than 6 inches thick up to the bottom of the girders under the tank, 1 part portland cement, 3 parts sand, and 6 parts screened gravel having maximum dimensions of 2 inches; (2) for the remaining portion of the work, except the dome, 1 part portland cement, 3 parts sand, and 6 parts screened gravel having maximum dimensions of 1 inch; (3) for the dome, 1 part portland cement, 2 parts sand, and 4 parts screened gravel having maximum dimensions of 1 inch.

The surfaces were treated in different ways to bring out the features of the design. The curtain wall of the footing up to the lower annular girder had no mortar placed next to the forms; but the concrete was well spaded, and after the forms were removed the voids were rubbed full with concrete mortar. The lower girder, the faces of the blocks at the intersection of the sides, the cornice, the upper girders, and the parapet wall were all treated as follows: Facing mortar was placed against the forms, backed with concrete, and the two tamped together. The facing mortar was made up of 1 part of waterproof cement and 2 parts of sand. The waterproof cement was made up of 4 lbs. of Medusa waterproof compound mixed with 1 barrel of portland cement. The object of the waterproof compound was to give a white colour to the surface, and make it stand out more prominently. The flat surfaces of the sides of the tower were given a pebble-dash plaster finish after the forms had been removed. The surface was first thoroughly sprinkled with water for about five hours, and then plastered with a coat of cement mortar thoroughly floated and trowelled hard to secure a close union with the concrete. After this coat had set, a second coat, consisting of small gravel about the size of a pea and mixed with mortar, was thrown on with a paddle and left rough. The outer surface of the dome and the girders around the base of the latter were given a coat of waterproof cement before the concrete had set. The results obtained in this manner were entirely satisfactory, as the different methods of finishing are each uniform, and the contrast obtained produces a pleasing general appearance. The concrete has stood for more than a year without any deleterious results. The structure cost $29,500 (£6145); and it was designed by, and built under the direction of, Mr. L. W. Anderson, the City Engineer of Grand Rapids.

The Kensal Green Carburetted Water-Gas Plant.

When dealing in last Tuesday's "JOURNAL" with the visit of the London and Southern District Junior Gas Association to the Kensal Green works of the Gaslight and Coke Company, special attention was drawn to the interest attaching to the carburetted water-gas plant, with its labour-saving devices. This portion of the works drew forth expressions of admiration on all hands. It was stated in our article that the plant was erected by Messrs. Cutler and Sons; but, to give honour where honour is due, it should be added that the firm simply supplied the shells to designs prepared in the drawing offices of the Gaslight and Coke Company's Engineering Department. In fact, the whole installation, including the unique arrangements for the supply of coke, was constructed to the Company's own designs; and the engineering staff are justly proud of the plant and its satisfactory working.

REGISTER OF PATENTS.

Gas-Lamps.

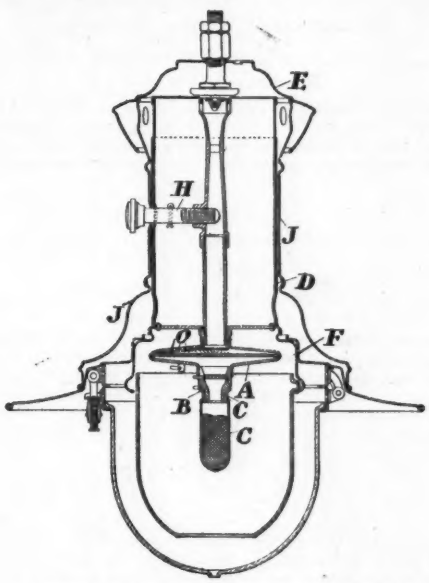
KEITH, J. & G., of Farringdon Avenue, E.C.

No. 28,360; Dec. 24, 1907. No. 1994; Jan. 29, 1908.

No. 7541; April 6, 1908.

These three applications for patents were amalgamated in accordance with the provisions of section 16 of the Patents Act of 1907—one complete specification for the three being lodged by the patentees on June 24 and accepted by the Patent Office authorities on Dec. 24 last.

The gas-lamps referred to are more particularly those used for high-pressure lighting with inverted burners; and the primary object aimed at is to provide "a lamp having an improved form of heater in which the mixture of gas and air is heated as highly as desirable, and in conjunction with which is employed a heavy metallic nozzle connected to the heater and serving to convey away as much heat as possible from the tip and transfer it to the heater."



Keith's Out-Door High-Pressure Gas-Lamp.

In the vertical section shown of a lamp embodying the invention, and adapted more especially for outside use, the heater A is made substantially in the form of a hollow disc or double cone with a diaphragm between, perforated at its edges. The heater is preferably made of some metal which does not readily oxidize with heat, or is plated with some such metal, and may be corrugated or ribbed on one or both of its faces. "In this heater the mixture of gas and air is heated as highly as possible," and in cases where two or more burners are used, the heater may be divided into segments by vertical partitions, or may be made up separately in forms other than circular in plan.

To the heater is directly connected a heavy metallic nozzle B (of good conducting material) formed in one piece with the lower part of the heater. A mantle ring C (of non-conducting material) is screwed closely on to the nozzle, so as to prevent the passage of flame between the two, and thus prevent the extreme tip of the nozzle from becoming too hot; or, in accordance with another arrangement (not new *per se*), the nozzle itself may be formed with a comparatively heavy metallic lining provided on the outside with a close-fitting non-conductor to which any form of mantle or mantle-ring can be attached in the usual way. Special attention is called to the importance of using a heavy nozzle, protected by a non-conductor, in conjunction with the gas and air heater. It "serves to convey heat to the heater—thus increasing the efficiency of the heater; while the heater, on account of its large area coming into intimate contact with the incoming mixture, serves to take away a large amount of heat from the nozzle."

The body of the lamp consists of a cylindrical outer casing D in which is fitted a box having two or more flat or concave sides not in contact with D and provided with a closed bottom. The whole structure is surmounted by a cowl or cap E.

The spaces at the sides between the inner box and the outer cylinder D form chimneys with outlets that discharge the waste products at a higher level than the primary-air inlets. To the lower portion of the outer casing is attached a chamber F, in which is located the heater; and to the chamber reflectors or globes may be attached by bayonet catches or the like.

In order to concentrate the waste heat from the mantle on the heater A, and to surround the mantle with an atmosphere of hot air, a cylinder or globe, open at the bottom, is suspended to the lamp body, and surrounded with an outer globe having air inlets at the top, so that the secondary air will pass between the globes and become heated before it reaches the mantle. To make the lamp windproof and waterproof, and suitable for outside use, another casing may be so arranged that both the primary and secondary air supply will enter by the same inlets, by or above the top of the outer globe, while the cowl E is extended downwardly.

The injector portion of the bunsen burner is of the usual venturian tubular form, as described in patent No. 16,955 of 1900 and No. 26,198 of 1901. In the lower portion of the burner, and beyond the constriction

a transverse screw H is tapped, with a part extending to the outside of the casing D; the diameter of the screw being such as almost to close up the bore of the burner tube when the screw is in its furthest in position. It is then possible to regulate the quality of the mixture so as to give the best results when burning.

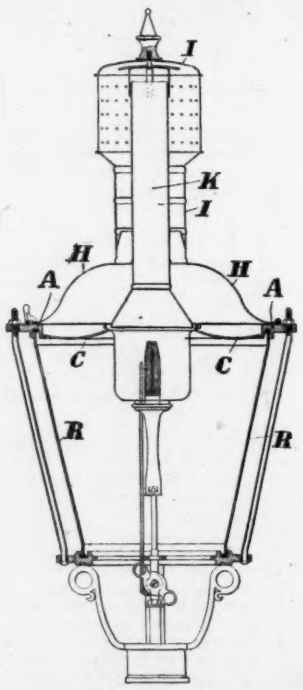
In the heater is a thermostat, which, when the heater is cold, leaves a certain minimum opening that gives a resistance in the burner about equal to, or even greater than, the resistance when hot, and which, as the heater warms up, gradually increases the opening until the latter reaches its maximum with the burner hot. The chief object of such an arrangement is to enable the mantle to be formed from the raw fabric on the lamp itself; and its effect is to prevent an explosion inside the mantle on first lighting-up after burning off the fabric. The thermostat consists of two strips O of metal securely riveted together and attached to the heater. They are preferably of iron and brass, with the brass (or the metal of the higher co-efficient of expansion) uppermost. When the burner is cold, the tongue bears hard against the opening into the heater, leaving only a small hole through the tongue, and which hole is so proportioned as to pass the correct proportion when the burner is cold. When the two-fold strip is heated, it bends away from the opening—thus giving a clear way all round to the sides of the inlet.

Incandescent Street Lantern.

GLOVER, T., of Queen Victoria Street, E.C.

No. 2607; Feb. 5, 1908.

This invention consists in suspending the glass globe surrounding the incandescent mantle from the reflector, and loosely attaching the intensifying tube or chimney at its upper end to the hood and frame, so that the bottom edge rests on the glass globe and makes an air-tight joint.



Glover's Incandescent Gas-Lamp.

As shown, the upper ring or rim A of the lamp is provided as usual with an inwardly extending flange or lugs, on which is placed the reflector C (of any desired shape), with a hole in the centre, in which is dropped a globe provided with a flange or splayed-out portion at its upper part, which engages the reflector so as to be carried by it. The bottom edge of the globe rests in, or touches, the gallery of the burner.

The roof H and hood I of the lamp are hinged to the top rim of the lamp as usual, and the chimney K is loosely positioned inside the hood and attached to clips held with the chimney loosely inside the hood above by the knob, and provided at its bottom with an inverted trough resting on the splayed-out portion of the globe.

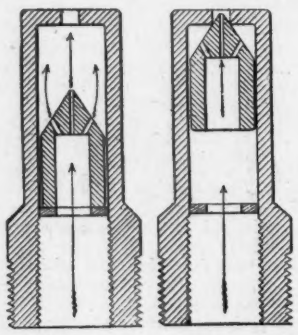
The lower part and body of the lamp is of the usual construction—such as by forming the upper and bottom rings with troughs, and placing the outside globe R between them. If the lamp is to be of the regenerative kind, air to support combustion is only admitted through the hood and roof.

High-Pressure Incandescent Gas-Burners.

GLOVER, W., of Queen Victoria Street, E.C.

No. 2608; Feb. 5, 1908.

This invention relates to regulating valves employed with gas-burners and in which the valve is hollow and of cone shape, and has a clear passage through, so that when the burner-orifice is closed by the valve, due to the extra pressure of gas, the gas will still flow to the burner. The object of the inventor is to so construct such an appliance for use in connection with the nozzle of an incandescent gas-burner used for high-pressure lighting that "more perfect regulation of the gas takes place, so that the lowering of the pressure of gas in the mains or supply pipes from the pressure pump or raiser shall make no very great appreciable difference in the volume of gas passing to the mixing-chamber."



High-Pressure Incandescent Lamp-Burners.

In the sectional elevations given of an incandescent gas-nozzle showing the loose fitting valve at its lowest and highest positions respectively, the interior of the nozzle has a valve of such a size as to loosely fit inside the tube forming the nozzle and allow free movement up and down by the pressure of gas. The valve is hollow, with one end of cone shape, having a straight small hole leading from the interior to the apex of the cone end, and with one or more holes leading from the centre to either side of the cone end. This valve is held in the tube forming the nozzle by a ring, and is of a weight to suit the pressure of gas of the district to which the burner is fitted.

The valve is so acted upon by the pressure of gas that when the pressure is high, it is lifted up to the hole in the top of the nozzle, and closes same. The cone end engages the hole so that the gas is forced to pass up the central hole in the coned end of the valve to issue in one fine stream into the mixing-chamber; but as the pressure of gas is lowered, so the valve falls and the gas flows out from all of the holes round the valve and passes to the hole in the nozzle in greater volume, "so that, irrespective of what pressure of gas there is at the nozzle, the light is not seriously lowered."

Refractory Mantles for Heating by Radiation.

DELAGE, M., of Paris.

No. 28,407; Dec. 24, 1907. Date claimed under International Convention, Feb. 27, 1907.

For the purpose of putting this invention into practice, a thread of asbestos is knitted upon looms similar to those employed for the tissues of the Auer mantles, so as to obtain a tube of continuous knitting with rather large meshes. The tube is cut into pieces of convenient lengths; and there is passed round it a lacing of asbestos thread so as to conveniently tighten up the head ready for a loop of asbestos.

As such a mantle does not change (either in form or dimensions) when it is placed in a flame, it is necessary to prepare it in such a way that it shall have the dimensions and shape it should finally possess. Thus, for example, for a heating mantle intended for burners consuming about 100 litres of gas per hour and of a diameter of 18 to 20 mm. at the head, the knitting is made with a thread of rather fine asbestos weighing about 50 to 60 grammes per 100 metres of length—"a knitting which, once it has been calcined, possesses rather open meshes and yields a mantle capable of being brought to a good state of incandescence, and which will not extinguish the flame."

Such a mantle of knitted asbestos thread is soft and supple, and would not retain its form. It is therefore necessary to harden it, and render it stiff, so that it will retain the form given to it. In order to so harden it, it is soaked in a bath which will harden the asbestos filaments and bind them together at the points where they cross in the knitting. For this purpose a solution of soluble salts of metals having refractory oxides is employed—for example, an aqueous solution of about 30 per cent. concentration of a mixture of nitrate of aluminium and nitrate of magnesium containing two-thirds nitrate of magnesium and one-third nitrate of aluminium. The mantle is then thoroughly air-dried and stretched upon a mould which gives it the exact form it shall retain. It is then carefully removed from the mould without altering its form, dried again if necessary, and then calcined upon a gas-burner. A second soaking may be effected after the first calcination and these operations repeated successively several times.

The refractory body thus prepared is next covered with oxide of cerium "for the purpose of improving its emissive power for radiant heat." In order to completely cover the hardened asbestos thread mantle with a thick covering of oxide of cerium, it should be soaked in a solution of a soluble salt of cerium, preferably the nitrate of a concentration of 30 to 50 per cent. The mantle is allowed to drain and dry, and is then again calcined on a gas-burner. The asbestos heating mantle is then ready for use.

The advantages of a large proportion of cerium oxide in refractory mantles for heating purposes are pointed out in the patentee's prior specification, No. 12,468 of 1905.

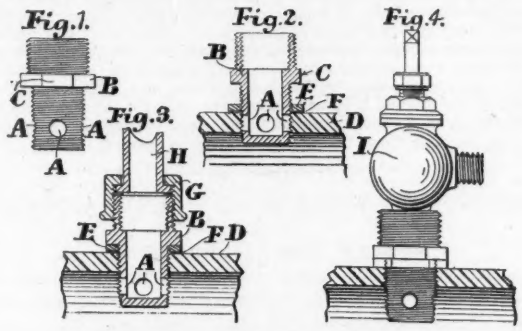
Ferrule for Tapping Mains under Pressure.

PRESTON, E. J., and CORDREY, H. C. F., of Deptford, S.E.

No. 8731; April 21, 1908.

According to this invention, the ferrule is made with a closed, instead of an open, end, and is formed with apertures some little distance from the closed end; furthermore, the ferrule is preferably provided with a collar (intermediate of its ends) having flats formed upon it for enabling the ferrule to be turned for screwing it up or down when the drilling and tapping apparatus has been removed from the main.

Fig. 1 is an elevation of the ferrule employed. Fig. 2 is a sectional elevation of the ferrule applied to a main in the position to shut off the fluid from the main. Fig. 3 is a similar view, with the ferrule screwed home and a service-pipe connected. Fig. 4 shows the ferrule with an ordinary screw-down valve applied to it.



Preston and Cordrey's Main-Tapping Ferrule.

The lower externally screw-threaded end of the ferrule is closed below, and provided near the bottom with lateral apertures A—four, as shown, or more or less. The collar B is provided with flats C to facilitate the turning of it up or down (as required) with a spanner or wrench. Fig. 2 shows the ferrule partly screwed into the main D so that the lateral apertures are covered by the wall of the main. Thus the ferrule, while in place and partly screwed down, shuts off the supply from the main. The ferrule is provided, if desired, with a lock-nut E, to prevent it being screwed down too far when it is introduced into the screw-threaded hole—for instance, in the machine for drilling, tapping, and inserting the ferrule in the main. While the fluid in the main is under pressure, a washer or packing ring F makes a tight joint, both when the ferrule is in the position shown in fig. 2, or in that shown in fig. 3; while as an additional precaution, there may also be a washer in between the upper part of the lock-nut E and the lower surface of the collar B.

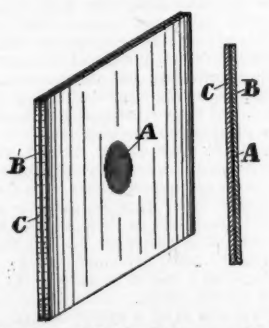
In fig. 3, the ferrule, being screwed home, is shown provided with a union G, by which the pipe H is connected to it. Fig. 4 shows the application of a screw-down stopcock I.

Photometer Screens.

SIEMENS, BROS., AND CO.; a communication from Siemens and Halske Actiengesellschaft, of Berlin.

No. 19,344; Sept. 15, 1908.

This invention refers to photometric screens of the bunsen grease-spot type, which, as is well known, are generally made by placing several thicknesses of translucent paper together one over the other—a hole being cut in the inner sheets to form the more translucent spot; or else the screen is made of opaque paper, a small spot of which is made translucent with grease or the like. The patentees point out that, in photometric measurements, when using either kind of screen, the spot does not always entirely disappear—due to the fact that in either case the surface of the paper is not a perfect reflector. "The more perfect the reflection from the surface of a photometer screen, or the translucency of the so-called grease-spot, the more will the results obtained be accurate." In the present invention, the opaque paper screen is replaced by a double-sided mirror, the surfaces of which act as reflectors on the on-falling light rays, and the grease or translucent spot is formed by using frosted glass, dull celluloid, or the like.



Siemens and Halske Photometer Disc.

In the constructional form shown, the double-sided mirror A (which may, for instance, be a metal plate, thin and highly polished, with a central opening) is placed between two frosted glass plates B and C; thus forming a like arrangement relatively to the translucent and opaque parts as in screens hitherto used. In another constructional form, a mirror of the size of the grease spot is placed between two frosted glass plates, so that the translucent and opaque parts are reversed relatively to one another, without thereby necessitating any alteration in the manner of using the screen. With this construction, the greater part of the screen is translucent, whereas the spot is opaque. The method is said to be simpler than the above-mentioned arrangement and cheaper to manufacture.

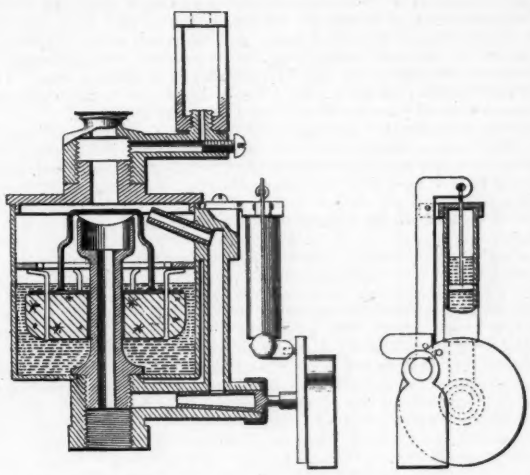
Where the light is diffused, instead of a mirror between glass plates, it is preferable to place it on either side of a glass plate.

Automatic Gas Cut-Off Devices.

NIEMANN, H., of Brooklyn, U.S.A.

No. 19,013; Sept. 10, 1908.

This attachment, for use with gas fixtures, is intended to cut off the flow of gas from the burner or outlet orifice entirely automatically upon the occurrence of certain prescribed conditions, or, in some cases, after a predetermined time interval. In its most ordinary form, the invention provides for automatically cutting off the flow of gas in case the flame at the burner is extinguished.



Niemann's Automatic Gas Cut-Off.

For this purpose, a chamber is made use of (as shown) containing a congealing, contractile substance, such as beeswax, paraffin, or sulphur; and a valve is adapted to be closed by the contraction and solidification of the substance at normal temperatures and opened by the expansion of the substance when melted. There is a float adapted to raise the valve when the substance melts, and adapted to fall and close the valve not only by its own weight, but by the suction and cohesion of the congealing substance when the latter cools and solidifies.

Various substances may be used, melting at a temperature of from 30° or 40° C. to 200° C.; but the patentee prefers ordinary wax for general use.

Means are also provided in certain forms of the invention whereby the gas can be instantly turned on at any burner regardless of a previous actuating of the automatic cut-off, and without waiting for the cut-off appliance to be heated; and also in some cases means are provided for automatically restoring the device to a condition where it performs its automatic gas cut-off functions after an initial manipulation has been made to start the device by establishing a bye-pass as above mentioned. Means are also shown whereby the flow of gas to a burner can be automatically cut off at a certain time interval after a predetermined manipulation or act—such as blowing out a special pilot flame. The device can also be arranged to extinguish a gas-flame a certain number of hours after it has been lighted.

APPLICATIONS FOR LETTERS PATENT.

611.—CRUDGINGTON, W., "Metallic tubing." Jan. 11.

645.—BONNIKSEN, B, and FLETCHER, H., "Automatic gas lighting and extinguishing apparatus." Jan. 11.

654.—CLOAKE, A. G., "Heating apparatus." Jan. 11.

683.—HARDT, J., "Reflectors for gas-lamps." Jan. 11.

735.—MORGAN, J. H, "Pipe-clip hooks." Jan. 12.

746.—CREMER, R., "Water-meters." Jan. 12.

751.—BRETT, C. G., and HENNEBERGER, F., "Inverted gas-lamps." Jan. 12.

793.—HOOKER, L. E., "Metallic tubes." Jan. 12.

814.—RATHMELL, B., "Gas-engines." Jan. 13.

858.—PUDNEY, F., and GOULTON, W., "Mantles." Jan. 13.

943.—ROOTS, J. D., "Mantle." Jan. 14.

955.—CORT, R., AND SON, LTD., SIMS, R. P., and WALKER, T. B., "Mouthpieces and lids for gas-retorts." Jan. 14.

972.—LIVERMORE, H. A., and BROWNING, H. W., "Automatic locking device for water and gas cocks." Jan. 14.

974.—PARKER, T., "Discharging vertical retorts for the destructive distillation of coal." Jan. 14.

981.—ELPHINSTONE, G. K. B., "Indicating and recording the flow of water through pipes." Jan. 14.

982.—KOPPERS, H., "Gas and coke-oven plant." Jan. 14.

1005.—LENTZ, H., "Transmission by liquids under pressure." Jan. 15.

1018.—WRIGHT, B. A., "Regulator for burners." Jan. 15.

1048.—COLBRAN, J. B., "Incandescent burners." Jan. 15.

1050.—COCHRANE, A. O., and SCOTT, H. G., "Heat regenerators for furnaces." Jan. 15.

1091.—THWAITES BROS., LTD., POOLE, F., and RAWCLIFFE, H., "Rotary blowers or pumps." Jan. 15.

1114.—LENTZ, H., "Rotary pumps." Jan. 16.

1143.—DONISTHORPE, E. S., "Liquid meters." A communication from W. Beresford. Jan. 16.

1145.—HOOD, F. A., PILL, R., and BRITISH AND COLONIAL LIGHTING CO., LTD., "Inverted burners." Jan. 16.

1168.—HOUSTON, G. W., "Anti-vibrating pendants." Jan. 16.

LEGAL INTELLIGENCE.

DISTRICT SURVEYOR'S FEES FOR RESERVOIRS.

In the "JOURNAL" for the 9th of June last, we noticed a case heard at the Lambeth Police Court where Mr. Ellis Marsland, a District Surveyor, claimed fees amounting to £297, for surveying, in accordance with the directions of the London Building Act, 1894, two covered storage reservoirs at Nunhead, which were being constructed for the Metropolitan Water Board by Messrs. J. Moran and Son, Limited. The hearing occupied several days; and the result was a decision in favour of the claimant and against the Contractors, who subsequently applied to the Magistrate (Mr. Horace Smith) to state a case. This came last Tuesday before a King's Bench Divisional Court, composed of the Lord Chief Justice and Justices Bigham and Walton.

The special case set forth that by section 138 of the London Building Act, 1894, it is provided (*inter alia*) as follows: "Subject to the provisions of this Act, and to the exemptions in this Act mentioned, every building or structure, and every work done to, in, or upon any building or structure, shall be subject to the supervision of the District Surveyor appointed to the district in which the building or structure is situate." By section 145 of the Act, it is provided: (*a*) Where a building or structure or work is about to begin, then two clear days before it is begun . . . the builder or other person causing or directing the work to be executed shall serve on the District Surveyor a building notice respecting the building, structure, or work." Section 154, subsection 1, of the Act provides as follows: "There shall be paid by the builder, or in his default by the owner or occupier, as the case may be, of the building or structure in respect whereof the same are chargeable, to every District Surveyor, in respect of the several matters mentioned in Parts I. and III. of the third schedule to this Act, the fees therein specified." Part I. of the third schedule specifies (*inter alia*) certain fees as payable to the District Surveyor in respect of new buildings. By section 5, sub-section 6, the expression "new building" means (*inter alia*) "any building erected after the commencement of the Act, and any space between walls and buildings which is roofed or commenced to be roofed after the commencement of this Act."

At the hearing of the summons, the following facts were admitted: The appellants constructed two covered storage reservoirs of a cubical capacity of 2,900,000 and 2,769,000 cubic feet respectively, and were in the course of constructing two other such reservoirs; the Board were authorized, by virtue of the Southwark and Vauxhall Water Act, 1894, and by the Metropolitan Water Board Act, 1906, to construct the said covered storage reservoirs; the reservoirs had a floor composed of concrete, and walls constructed of brickwork backed by concrete and earth, and were completely covered in by a series of brick arches supported by brick piers 20 feet high. The brick arches were covered with a layer of concrete, which, in its turn, was covered with earth. The respondent stated that he was never supplied officially with copies of any of the parliamentary or other plans, but that a plan was given to him by a member of the Institution of Civil Engineers. Before commencing the work, the appellants gave notice to the respondent, as required by section 145 of the London Building Act, 1894, that they were about to carry out the construction of the reservoirs; but the appellants never in any way consulted him in relation to the works after giving the notice. The respondent surveyed the premises in the ordinary course of his duties during the two years they were in the process of construction. On behalf of the appellants, it was contended that the reservoirs in question were not buildings or structures within the meaning of sections 138 and 154 of the London Building Act, but were in the nature of embankment or retaining walls; and that the reservoirs, having been constructed under the powers of the Special Acts of Parliament mentioned, were not subject to the provisions of the London Building Act, nor to the supervision of the respondent, inasmuch as the provisions of the Special Acts were inconsistent with the London Building Act. In particular, it was contended that this was so, since but for the Special Acts the reservoirs in question could not have been built at all. On behalf of the respondent, it was submitted that the reservoirs were buildings or structures, and that therefore he was entitled to his fees. The Magistrate gave judgment in favour of the respondent, upon the ground that the reservoirs were buildings in fact, and that in law they were buildings coming within the scope of the London Building Act, 1894, and that the respondent was entitled to his fees. He stated that he so decided feeling bound by the judgments of the High Court in the cases of *London County Council v. Wandsworth and Putney Gas Company*, *Charing Cross Electric Corporation v. Woodthorpe*, and *Whitechapel Board of Works v. Crow*.

Mr. Danckwerts, K.C., Mr. Courthope-Munroe, and Mr. S. G. Turner appeared for the appellants; Mr. Horace Avory, K.C., and Mr. Rowland Burrows for the respondent.

At the close of the arguments, the Lord Chief Justice delivered judgment, in the course of which he said the only point the Court had to consider was whether the District Surveyor—he having received notice under the London Building Act, and having discharged his duties under the Act—was or was not entitled to his fees. It had been said that the works in question did not fall within the scope of the London Building Act, as the terms of the Board's Private Act were wholly inconsistent with the Public Act. He was glad the case had come before them in the way it had done, because, if they were wrong in the judgment they were giving, they could be put right when the case was taken to the Court of Appeal. Having referred to the material provisions of the London Building Act, his Lordship said that, as he understood it, the Magistrate had found that the work in question was a building or a structure within the meaning of section 145 of the Act. For this purpose, nothing turned upon the word "building" in contradistinction to the word "structure." Therefore, upon the broad question of whether this was a building or a structure, the decisions to which the Magistrate referred were, in his opinion, binding on the Court. It was said on behalf of the appellants that if a building did not come within the designation of a domestic building, or in the nature of a warehouse, it was outside the Act altogether. He did not agree with this. He was unable to accede to the argument on behalf of the appellants that this was not a building or a structure. In these circumstances, what they had to decide was whether the mere statutory power to construct a particular work was of itself sufficient to oust the application of the London Building Act; and he had not himself the slightest doubt that a portion of the work in question required that there should be some supervision by the District Surveyor. Having referred to the cases bearing on the point, his Lordship said he was of opinion that there was nothing in the Private Act under which the works were constructed which was inconsistent with the duties of the District Surveyor under the London Building Act. He thought the decision of the learned Magistrate was right, and that the appeal should be dismissed with costs. Justices Bigham and Walton delivered judgments to the same effect. Leave to appeal was granted.

METROPOLITAN WATER BOARD'S RATING APPEALS.

Decision of Quarter Sessions Upheld.

Readers may remember that on various days in 1906 and 1907 the Court of Quarter Sessions for the County of London was engaged in hearing appeals by the Metropolitan Water Board against the valuation lists of 101 parishes in the City of London Union, in respect of property consisting of mains and service-pipes lying under the public highways, and used for the transmission of water. Certain of these mains and pipes were only indirectly productive of profit to the Board. It was submitted on behalf of the Assessment Committee of the Union that the proper method of ascertaining the rateable value of the hereditaments in the 101 parishes was first to deduct the rateable value of the indirectly productive part of the undertaking, and then to apportion the rateable value of the directly productive part in the ratio of the net profits of the Board in the parishes, arrived at by deducting 2·14d. per 1000 gallons (representing the working expenses) from the figure of 18·98d. per 1000 gallons (representing the average price obtained in the Union), and not in proportion to the gross receipts, which was the method adopted by the Board. It was proved to the satisfaction of the Court that the whole undertaking was conducted as an undivided one. The accounts, including the receipts and expenditure, were kept and managed as for one undertaking; and it was impossible to ascertain what were the expenses in any particular parish or union of parishes apart from the whole. The Court allowed the appeals, subject to a case being stated for the opinion of the High Court on the question whether or not the Court of Quarter Sessions were wrong in law on the principle on which the rateable value of the property had been ascertained.

The matter came in due course before the King's Bench Division (consisting of the Lord Chief Justice and Justices Bigham and Walton); and judgment was delivered on Friday. The Lord Chief Justice said the Court of Quarter Sessions arrived at a conclusion upon the evidence before them; and a Higher Court ought not to override this decision unless they had gone wrong upon a point of law. The parties agreed as to the figures upon which they were to act as to the rateable value of the whole of the undertaking, and adopted £1,202,086; and the respondents (the Assessment Committee) said that, after deducting the rateable value of the indirectly productive portion of the undertaking, the rateable value ought to be calculated from the net profits of the Board from the 101 parishes, which ought to be arrived at by deducting 2·14d. per 1000 gallons from 18·98d. per 1000 gallons, the average price obtained in the City of London Union, and that the rateable value ought not to be calculated in proportion to the gross receipts. He was not satisfied that, as so stated, such a result was possible by taking gross receipts and deducting the average expenses. The question was, What rent would a hypothetical tenant give for the productive subject-matter? Strictly speaking, in ascertaining the rateable value, the net profit of an undertaking was what ought to be taken into account if it could be arrived at. In dealing with vast undertakings such as railway and water companies, if gross receipts and expenses could be calculated, the rent which a hypothetical tenant would give would be the net receipts; but it was impossible to lay down as a rule of law that this was the proper method of calculation, and it was impossible to say that the Court of Quarter Sessions ought to have adopted this standard in the present case. There were two findings in the judgment of the Court which he thought were conclusive of the matter, and which made it impossible for the Higher Court to order them to abandon the basis upon which they had proceeded. They were these: "We are of opinion, on the evidence adduced, that it is impossible to ascertain what are the expenses in any particular parish or union of parishes apart from the whole, except by hypothetical calculations based upon no accurate facts;" and, "We find that none of the respondents in these appeals have put before us any other practical method of valuation." This was a finding of fact beyond which they (their Lordships) could not go. It was not denied that gross receipts might be a test of rateable value; and it could not be said that such a basis was wrong as a matter of law. It could only be said to be wrong if it was so as a matter of fact. How could this Court send the case back to the Quarter Sessions for further investigation after the conclusion which had been arrived at? They were asked to say whether Quarter Sessions were wrong in law in the principle upon which they had ascertained the value of properties. He could not say they were; and therefore the case ought not to be sent back for further calculations to be made. The appeal must consequently be dismissed. Justices Bigham and Walton concurred.

Robbing a Meter and Damaging Property.—At the County of London Sessions last Tuesday, Charles Johnson, a labourer, pleaded guilty to stealing lead piping and 11s. 4d., the property of the Gaslight and Coke Company; and it was charged against him that he had done £25 worth of damage in an unoccupied house. To extract the money from the meter he smashed it, leaving the gas escaping. He had also removed part of the water-pipes, and left the water running. He was sentenced to twelve months' imprisonment, with hard labour.

QUESTION AS TO THE "DELIVERY" OF WATER.

In the King's Bench Division of the High Court of Justice last Wednesday, the Lord Chief Justice and Justices Bigham and Walton had before them an appeal from a decision of four Justices at the Mark Cross Petty Sessions in July last. The proceedings which gave rise to the appeal were reported in the "JOURNAL" for the 11th of August last, p. 393.

Mr. Macmorran, who, with Mr. Humphreys, appeared for the appellants (the Crowborough Water Company), said that, though only a very small sum was really in dispute, the case was one of considerable importance to water companies. It turned entirely on the construction of an Act of Parliament which authorized the appellants to supply water within certain limits, and incorporated the Water-Works Clauses Act, 1847, which required that the supply should be constantly laid on at such pressure as would make it reach the top storey of the highest houses in the district, unless a Special Act provided otherwise. The Special Act in this case provided that the Company should furnish a constant supply of water except at a higher level than 700 feet above Ordnance datum. In the district in question there was an important residential portion considerably above the 700-feet level; and the service reservoir only allowed water to be supplied by gravity to a height of 600 feet. In order to raise the water to the necessary height, it was pumped up to another reservoir on Crowborough Beacon, with a water-tower, which enabled it to be delivered to a height of 800 feet. The house of the defendant in the original proceedings was so situated that the ground floor was just under the 700-feet level; but the water he received flowed into a cistern which was just over it. Under section 35 of their Act, the Company were empowered to levy certain rates, and in addition to charge one-half the amount in respect of water delivered at a higher level than 700 feet. Counsel read the special case stated by the Justices, which set forth that the defendant was the occupier of a house and premises of a rateable value of £56. The Company, having supplied him with water, claimed 19s. 7d., which was 7 per cent. on the value; 9s. 10d., being half this amount, on the ground that the water was supplied and delivered at a higher level than 700 feet; and 4s. 10d. in respect of closets and baths. The defendant admitted the claim to the 19s. 7d. and the 4s. 10d., but disputed the charge of 9s. 10d. The Justices held that the water was delivered to the respondent at the point where the pipes and fittings, which were his property, were connected with the main; and as this was below the 700-feet level, they gave judgment for only £1 4s. 5d., disallowing the 9s. 10d. He submitted that the point of delivery of the water was the cistern, which was at a height of 701·66 feet, as it was the pressure in the mains, arising from the high-level reservoir and water-tower, which carried it into the cistern.

Justice Bigham remarked that the Magistrates seemed to hold that the property in the water passed to the respondent as soon as it entered his pipes, and that the entry must be taken to be the point of delivery. Mr. Macmorran suggested that this was a false issue. It was very doubtful whose property the water would be in the house. The Lord Chief Justice said in the opinion of the Court the case did not depend upon any new legal question as to where the property in the water passed, but upon whether or not the Company had supplied and delivered water at a higher level than 700 feet. Their case was to the effect that they had so delivered it; and therefore the Magistrates ought to have allowed the full charge. The matter would have to go back to them with a direction to make this order.

A Gas Company Fined for having Unjust Weights.

Last Saturday week at Harlow, the local Gas Company were summoned for having in their possession for use in trade unjust weights. Inspector Card visited the Company's premises and found two ½-cwt. weights, one of which was 1 lb. 2 oz. light, and the other 3 oz. Mr. W. E. Deards, Secretary to the Company, said there was an accident to the scales last November, through a horse backing on to them. The scales were afterwards repaired; but the weights were not tested. The lead might have been knocked out from the bottom by the accident. Mr. F. C. Edwards, Chairman of the Company, and Mr. S. Young, J.P., a Director, expressed regret at the occurrence. The Chairman: "Quite so; but we must treat a wealthy corporation as we should an individual." A fine of 20s. and 4s. costs was inflicted; and it was ordered that the weights should not be used until they had been readjusted.

Searching for a Gas Escape: Compensation Law Point.—During last November, a barman, named Haines, at the George the Fourth public-house, in the Southwark Bridge Road, was so seriously injured by a gas explosion that he subsequently died. At the inquest, it was stated that he and his employer both detected a smell of gas, but could not tell where the escape was. Deceased continued the search, and entering the dining-room, where the water-slide chandelier had fallen down, the explosion occurred. Under these circumstances, the man's widow claimed from the lessee of the public-house £300 compensation for her husband's death; and the case was heard at the Southwark County Court last Friday. For the respondent it was contended that deceased had not been ordered to investigate the escape; and that as he did so voluntarily, the act did not arise "out of, or in the course of, his employment." His honour Judge Bray, however, held that as the act was a natural one in the employer's interest, the widow was entitled to compensation. It was admitted on both sides that a housemaid who had searched for escaping gas would clearly have been performing her domestic duties. Mrs. Haines was therefore awarded the £300 compensation.

The Skegness Urban District Council have unanimously decided that the Clerk be instructed to send a written notice to the local Water Company stating that it is the intention of the Council to purchase the new water-works.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN COMPANY'S RATING APPEALS.

Objections to the Bermondsey Borough Accounts.

Somewhat unexpectedly, Mr. A. Carson Roberts, the Local Government Board Auditor, on Monday of last week, summoned another meeting of the contending parties in the case of the appeal of the South Metropolitan Gas Company against the passing of the Bermondsey Borough Council accounts for 1907-8, on the ground that certain payments made to Messrs. Dinwiddy and Sons, who acted for the Council at the last quinquennial valuation, were not in accordance with the contract made with that firm, and that under the circumstances the charges in themselves, if within the contract, were excessive. Mr. H. Donald Gordon, who heard the appeal of the Company against the Woolwich accounts, on similar grounds, in October last, and has not yet delivered judgment, had arranged to hear the Greenwich appeal on the same day; and the Company's representatives, lay and legal, were in attendance. It was learnt, however, that he was waiting at the Bermondsey Town Hall to hear the decision of Mr. Carson Roberts; and accordingly a move was made to the hall.

The facts of the various cases are similar in character, and have been already reported in the "JOURNAL." In four London boroughs (Bermondsey, Woolwich, Greenwich, and Lewisham) the South Metropolitan Gas Company are opposing, as interested ratepayers, the passing of the above-named accounts, on the ground that the Councils have improperly paid to their quinquennial professional valuers considerable sums of money to which they were not entitled. Messrs. Dinwiddy and Sons were in 1904 retained to value certain special properties, including the gas undertakings, by the Councils; the contract stating that 15s. per cent. on the valuations as finally adopted by the Assessment Committees should be their remuneration, *plus* £5 5s. a day for attendance at appeals, if any should be taken into Court. The Company appealed against the valuation put upon their properties in the four areas. It was agreed that one case should be taken as a test case and the others decided by it; and the result was that the Company lost. Messrs. Dinwiddy's bill of costs against the Company, in the Bermondsey appeal alone, came to £775 18s.; but on taxation the amount was reduced to £127 18s. In Greenwich, their bill as delivered came to £1035 10s., reduced on taxation to £294 15s.; in Lewisham, to £428 18s., reduced to £164 13s.; and in Woolwich to £997 18s. 6d., reduced to £151 17s. 6d.

In the course of the hearing, it was mentioned that in the case of Bermondsey alone Messrs. Dinwiddy received £1809 in percentage, apart from the sum now appealed against—the amount named being in no way objected to by the Company; and that in one borough where the Council declined to pay the whole of the taxed-off costs, Messrs. Dinwiddy made an allowance of about half of the disputed amount. Afterwards the Company found that the Council had paid the firm the balance which had been taxed off, apart from the very large sums they had received under the contract for 15s. per cent. on the valuations. As large ratepayers, they appealed, and submitted that the balance should be disallowed.

The Bermondsey case had a first hearing a few days ago, and was then adjourned (see *ante*, p. 120). At the resumed inquiry, Mr. Conrad Dinwiddy generally defended his firm's bill. Mr. Carson Roberts said that, in his opinion, £95 should be deducted from the account for the preparation of the case for appeal, £7 as Bermondsey's share of the reduced amount to be allowed against the four boroughs for attendance at Court, and £10 in respect of the 5s. and 3s. 6d. charged for 121 letters, making a reduction of £112 in all.

It then transpired that when the Bermondsey Borough Council objected to Messrs. Dinwiddy's bill, the firm offered to reduce it by £122 17s. without prejudice; but that after Counsel's opinion had been given that the Council were entitled to pay the bill, the full sum had been insisted upon.

The case was again adjourned for the Company to decide whether they were prepared to accept the Auditor's disallowance of £112, and whether Messrs. Dinwiddy would agree to the disallowance or renew their offer of an abatement of £122 17s.; both parties to have a right of appeal against the decision if they declined to accept it or failed to agree.

The Woolwich Borough Accounts.

Mr. Gordon sat again on Thursday last, at the Union Offices, Woolwich, to resume the hearing of the application of the South Metropolitan Gas Company that a surcharge should be made against the Woolwich Guardians with respect to certain payments made by them to Messrs. Dinwiddy and Sons at the last quinquennial valuation; such payments representing the sums taxed off Messrs. Dinwiddy's bill of costs against the Company after their appeals had been decided against them, and they had been ordered to pay costs. The facts of these cases (there are four in all) have already been reported. Mr. Gordon, who had heard the arguments of the appellants at Woolwich in October last and previously, had announced at Bermondsey that he should on this occasion state what he intended to do on the disputed accounts; and proceeded to make the following disallowances, which, he said, would be the subject of a surcharge: From the sum of £451 10s. charged for preparing the case for appeal (which work, the Company contended, had practically been paid for by the percentage on the preparation of the quinquennial valuation), £110 12s. would be deducted; £1 1s. per day for seven days would be disallowed from the charge for attendances at Court, or £7 7s.; and from the charges of 5s. and 3s. 6d. each for 278 letters a sum of £10 would be disallowed—making £127 19s. in all.

Mr. L. N. S. Pasmore (of Messrs. Hicklin, Washington, and Pasmore), who appeared for the Company, contended that the disallowance on letters was inadequate. In Bermondsey, £10 had been disallowed on 121 letters; and he asked that £30 should be put down in respect of letters here. Mr. Conrad Dinwiddy said the firm received this sum for

letters all over the country. Some of these might be formal, and identical in character in each borough, but others were in the nature of reports. Mr. Pasmore pointed out that reports were separately charged for. The Auditor promised to reconsider the item.

Mr. Passmore then asked for a further adjournment; saying that only the previous day he had received details showing how some heavy charges for the preparation of the case for appeal had been made up, and these intricate accounts should be compared with those charged against other boroughs for similar work. Challenged by the Auditor to point out any specific items in the bill of costs which he alleged should not be there at all, because they had been previously included in the percentage payments for the quinquennial valuation, Mr. Pasmore indicated two, and promised to call the Auditor's attention to more before the next sitting.

Mr. Dinwiddy said he wished it to be clearly understood that, whatever might be the result of the appeal, his firm did not intend to allow any public representative to be at any personal loss if surcharged for paying them what they believed to be a fair bill of costs.

Mr. Tom Cutler, the Clerk to the Guardians, said that though his Board would not take action on any technical grounds, he was pretty certain the case would end in the King's Bench Division, and he should certainly advise his Guardians to take it there.

The Auditor, in adjourning the hearing till the 11th prox., said that, in taking the line he was doing, he wished to point out that any decision he gave was open to appeal. He did not wish to cast any reflection upon the *bona fides* of the persons making the charges, as they had put down amounts which they thought were due to them.

Mr. Pasmore expressed his agreement with the remark.

GAS, ELECTRICITY, AND WATER SUPPLY IN JERSEY.

There is at present before the Legislative Assembly of Jersey a Bill to place under public control the supply of gas, electricity, and water. It consists of a preamble and nine articles; and it will be seen therefrom that in certain respects—viz., in the articles relating to the auditor and the right of entering works—it goes rather beyond what has been done on this side of the Channel. The following is the text of the Bill.

Whereas it is in the public interest to place commercial undertakings for the supply of water, gas, and electricity under public control, the States, subject to the sanction of the King's Most Excellent Majesty in Council, have adopted the following Act.

1.—The supply of water, gas, and electricity to the public by a commercial undertaking must be licensed by the States.

2.—Application for a licence must be made to the Committee of Public Works. The undertakers shall annex thereto: (1) An assenting Act from the competent Parochial Authority, (2) the scheme of undertaking, (3) a financial statement with an indication of the moneys or resources at their disposal, and shall produce all documents and supply all information which shall seem to the Committee necessary and useful to enlighten the States on the purpose of the undertaking, its scope, and the advantages which the public might derive therefrom. The Committee may make all inquiries, expert investigations, and publications as may appear necessary and useful. The Committee shall report to the States, who will decide thereon. Any development of the undertaking outside the limits of the licence shall likewise be licensed by the States.

3.—The licence shall specify: (1) The names of the undertakers; (2) the settled scheme of the undertakers; (3) the capital involved; (4) the special conditions imposed as to public safety; (5) the tariff of supplies, with conditions of rise and fall thereof; (6) the facilities, concessions, or powers granted to the promoters; (7) the duration of the licence; (8) such other conditions as the States shall have established in the public interest. The licence shall be printed, published, and posted.

4.—The Committee shall see that the conditions of the licence shall be observed. For this purpose the Committee and its agents shall at all times have free access to the promoters' property. If the conditions are not observed, the Committee shall report to the States, who may cancel the licence.

5.—The undertakers shall, before the 1st of March of each year, transmit to the Greffier of the States, in a form which shall be determined in the licence: (1) A statement of the capital involved in the undertaking, and the case made thereof; (2) A detailed account of revenue and expenditure to the 31st of December of the preceding year; (3) A declaration of the moneys placed in reserve or added to capital, and of the profits distributed to interested persons—under a penalty which shall not exceed £5 for each day's delay. These documents shall have been audited either by the auditor of the States or by an auditor appointed by the Committee. The auditor shall report to the States; and these documents shall be public documents.

6.—A licence granted under this Act shall be subjected to the operation of any subsequent Legislative Act.

7.—The cost of the application for a licence and of the preparation and granting thereof shall be chargeable to the undertakers. They shall indemnify the States for all costs and expenditure to which the operation of this Act, so far as it concerns them, might render the public liable; and for this purpose they shall in the first instance provide adequate security. In this Act the words "commercial undertaking" shall include the commercial undertakings now operating; nevertheless, the condition of public toleration (*l'état de tolérance publique*) shall continue, so far as they are concerned, for a period of two years from the date of the promulgation of this Act. If at the expiration of this period these undertakings shall not have been licensed, the condition of toleration shall *de facto* cease.

William R. Pickford, an ex-Member of the Congleton Town Council, and formerly a prominent master fustian-cutter in the town, was recently found asphyxiated; a pipe connected with a bracket, the tap of which was turned on, being in his mouth. He had been suffering from depression.

DEPARTMENTAL COMMITTEE ON THE TRUCK ACTS.

Evidence of the Late Sir George Livesey.

As long ago as April, 1906, a Departmental Committee was appointed to inquire into the operation of the Truck Acts, and to consider and report on what amendments or extensions of the Acts, or changes in their administration, were desirable. One of the matters specially mentioned as needing investigation was whether fines and deductions from wages should be prohibited; and another was whether the "living-in" system, as applied to shop assistants and certain classes of workpeople, gave rise to abuses needing remedy. The members of the Committee were the Rt. Hon. Thomas Shaw, M.P., Lord Advocate for Scotland (Chairman), Mr. E. A. Brotherton, M.P., Mr. F. Cawley, M.P., Mr. M. Delevingne, of the Home Office, Mr. J. R. Macdonald, M.P., Mr. F. Maddison, M.P., Mrs. H. J. Tennant, and Mr. A. F. Yarrow. About four months after the inquiry began, Mr. Macdonald resigned his seat on the Committee; and his place was taken by Mr. S. Walsh, M.P.

A full hearing was given to the numerous interests concerned; and as a result, the inquiry lasted two years and eight months. The Committee held 82 meetings, and examined no less than 118 witnesses. In view of the fact that the provisions of the Statutes have notoriously given rise to great difficulties of interpretation, the Committee first of all ascertained the views on the matter held at official headquarters; and this evidence was followed by the testimony of numerous representatives of employers and employed, and of the Post Office and the War Office. Doctors gave evidence on the subject of deductions from wages for medical attendance; and numerous private individuals also attended before the Committee. Finally, reports were obtained as to the laws of the Colonies and certain foreign countries on the subject of truck and fines and deductions from wages, and as to the industrial tribunals of France and Germany.

Main Provisions of the Truck Acts.

The Truck Acts are three in number, dated respectively 1831, 1887, and 1896, in addition to which there are two other Acts which have a direct bearing on the matter of truck and deductions—namely, the Hosiery Manufacture (Wages) Act, 1874, and the Shop Clubs Act, 1902. The 1831 Act provides, first, that in the contract of service wages are to be made payable in current coin of the realm only, and the entire amount of wages earned is to be so paid; and, secondly, no condition is to be imposed in the contract of service, directly or indirectly, as to where, how, or with whom, wages, or any part of wages, are to be expended. Certain exceptions were made to the general provisions, to allow of the employer supplying his workers with medical attendance, houses, meals, &c. The application of the Act was limited to "artificers" in certain trades; but the Act of 1887 extended the principle to any "person who, being a labourer, servant in husbandry, journeyman, artificer, handicraftsman, miner, or otherwise engaged in manual labour, whether under the age of 21 years or above that age, has entered into, or works under, a contract with an employer," whether the contract be express or implied, or whether it be a contract of service or a contract personally to execute any work or labour. There was also imposed on the Inspectors of Mines and Factories the duty of enforcing the Acts in factories, workshops, and mines.

The definition of the term "manual labour" has, it is remarked by the Committee, produced some curious distinctions by the Law Courts; and the question of deductions was also raised in a series of actions. The effect of the decisions was that things supplied to a worker not as recompense for his work, but as means of doing his work, were not supplied as part of wages. The worker's wage, being only the recompense for his work, was what remained after deductions in respect of things so supplied had been made. The question of fines was not raised until much later; but in 1889 the High Court held that the deduction from wages of fines for spoiled work, misconduct, injury to property, &c., was not a payment of wages otherwise than in coin of the realm, but a non-payment of wages, and that a non-payment of wages, or any part of wages, was not an offence against the Truck Acts. As to contributions to sick and benefit societies being made a condition of employment, and the contributions being deducted from wages, and paid over to the club, the House of Lords held that "a payment made by an employer, at the instance of a person employed, to discharge some obligation of the person employed, or to place the money in the hands of some person in whose hands the person employed desires it to be placed, is a payment to the person employed as much as if the current coin of the realm had been placed in his or her hands." Another point raised was an employer's right to deduct from wages the amount of a debt owing to him by a worker, who had been ordered by a Court of Summary Jurisdiction to pay his master a fine. This deduction was held to be illegal, on the ground that it was a "payment in account," and therefore a payment otherwise than in current coin of the realm.

By the Truck Act of 1896—which is the latest of the Acts so named—deductions in respect of fines in regard to loss to the employer by bad or spoiled work or materials, &c., and in regard to supply of materials, tools, and other conveniences to the worker were made subject to conditions intended to protect the worker against harsh or unfair charges on the part of the employer. In the case of an employer who made a deduction from wages of 2d. in the pound to cover his liability under the Workmen's Compensation Acts, it was held by the High Court that no infringement of the 1831 Act had taken place—that what the employer had done was to reduce the wages of his workmen by the amount in question, and so to reach a net wage. As to this, the Committee say: "In our opinion, it would be the wiser course for employers and workmen to deal plainly with net wages as such-and-such a definite sum."

Recommendations of the Committee.

The report of the Committee, which fills nearly eighty foolscap pages, contains numerous recommendations, among which are the following regarding the Truck Acts: That the whole law on the subject of truck and fines and deductions from wages should be consolidated, with

amendments which they indicate. That the Truck Acts should be extended to outworkers. That the powers of the Factory Inspectors with regard to the enforcement of the Truck Acts should be extended to docks and warehouses. That fines should be totally abolished in the case of young persons of 16 and under. That the maximum fine, or accumulation of fines, in any one week permissible by law should not exceed 5 per cent. of the wages of the workman for the week. That the deduction for, or payment of, a fine should be made only in the week in which it is imposed, and that no claim for arrears of fines should lie. That employers who maintain the system of fining should furnish to the District Inspector of Mines or Factories a copy of the fine-agreement and of the fines; and that the fine-agreements should be publicly posted at the works. That the provisions of the Act of 1896 should be amended so that the prosecution should have the option of proceeding against the employer for imposing an unfair or unreasonable fine in cases where such a fine is imposed without an agreement. That where it is shown that a bonus is liable to be withheld as a punishment, the Court shall have power to decide whether the bonus is used by the employer as a means of evading the Statute. That in respect of deductions for bad and negligent work, &c., the existing provisions of the law should be repealed, and the matter be left to be regulated under the provisions suggested in regard to fines and the ordinary common-law rights of the parties. That in respect of materials, no deductions or payments should be allowed in respect of things which go into the substance of the fabric or product. That in respect of the use of tools, machinery, standing room, light, heat, &c., no deductions or payments should be allowed. That in respect of the supply of tools, &c., which become the property of the worker, deductions should be allowed, subject to existing provisions. That in respect of the provision of mess-rooms and similar facilities, no deductions should be allowed—any charges for these facilities to be by way of a separate bargain and a separate payment. That in respect of rent no deductions should be allowed; the matter being left to be dealt with by free contract, entirely separate from the contract of employment. That the supply of a house or of lodging accommodation on the employer's premises should be allowed. That in regard to medicine and medical attendance the provision empowering the employer to contract to supply his men with medical attendance, &c., should be repealed; the doctor must be the choice of the workmen themselves; the contributions may either be collected by the workers or at the request of the men deducted from wages. That the supply of fuel for home consumption be allowed. That the supply of food and drink (non-intoxicating) to be consumed on the employer's premises, and deductions therefor, be allowed. That in respect of benefit societies attached to works, no deductions should be allowed except in the case of (*a*) societies certified under the Shop Clubs Act, and (*b*) societies authorized under statutory powers to make deductions. That in respect of benefit societies outside the employment no deductions should be allowed.

The Committee's Views on Deductions for Benefits.

On the subject of deductions for benefit societies, &c., which forms the basis of the last two recommendations, the Committee conclude by saying: "We should be sorry to put any obstacle in the way of the beneficial objects aimed at by these societies; but we have not heard any evidence which has convinced us that these contributions could not be collected equally well without the power to deduct money from the workers' wages. We think that men and women would be more likely to follow their own inclination in regard to joining these works clubs if contributions were collected in the ordinary way without the employer having recourse to deductions. We are of opinion that workers should be left entirely free in this matter, and that the only way by which to prevent indirect compulsion is to abolish these deductions." Mr. Delevingne, however, in a separate memorandum, gives the opinion that the desirability of prohibiting deductions for these societies "is against the weight of the evidence;" and he draws attention to the strong statements as to the serious effects that would be produced which were made by Mr. Cadbury, Sir George Livesey, and others. Mr. Yarrow also expresses agreement with this view. There is also a minority report dealing with certain parts of the inquiry.

Sir George Livesey called.

Our notice of the mass of evidence given before the Committee—which occupies two large Blue-Books—must be confined to that tendered by the late Sir George Livesey, which referred to the points that have more particularly been alluded to above. Sir George was called on May 1, 1907, which was the thirty-ninth day of the inquiry; and his testimony occupies over thirteen columns.

In answer to the Chairman, witness said that the system to which he was going to refer was in operation in both the South Metropolitan and the South Suburban Gas Companies. Many gas companies had superannuation and other funds for their workmen; and the basis of all these funds was purely voluntary—there was no compulsory contribution. In some cases there were voluntary funds established by the companies and the men making their own subscriptions. The workers established a fund and collected the subscriptions and worked it themselves; but there was an immense difficulty in collecting the subscriptions. The funds, however, to which he first referred were established by, and under the authority of, the Company, who subsidized them to a very large extent. If the matter were a purely voluntary thing worked by the men themselves, a certain number of the men would belong to it; but it could never be made very extensive—in fact, his men had a fund called "The Widows and Orphans' Fund." They collected pennies a week; but they had asked the Company to do it for them. So that his view was that the simplest and the easiest and almost the only practical way for collecting the subscriptions was to deduct them from the wages, with the men's authority and consent. His evidence as to the South Metropolitan Company might be taken on the understanding that it would apply also to the South Suburban Company. The South Metropolitan Company had three of these funds. First of all there was the sick and burial fund, which was established in 1842 by his father, who was then Secretary and Manager. Then there was the superannuation fund, also established by his father, in 1855, when he (witness) was in the service of the Company. After his father's death in 1871, he was the Chief Executive Officer of the Company; and in his early days he paid the wages and stopped the money from them. Thus he had been in touch with the practical working all along. Then there was the accident fund, which was established in 1897, and brought under the Workmen's Compensation Act. The subscriptions to all these funds had always been collected by deductions on pay-day, with the consent of the men. No man was required as a condition of employment to join any of the funds. A considerable number of men in both his Companies did not belong to the superannuation fund. There were, however, very few regular men who were not on the sick and burial fund, and practically none—only one—not on the accident fund. When men were employed, they were asked as to their willingness to join the accident fund; but nothing was said for a little time about the sick fund and superannuation fund. When they had been in the service of the Company for (say) a year, they often themselves applied to be put on the funds, thinking it would be a sort of guarantee of constant employment. They did not put a man on the funds if there was a probability that he would not stay in their service. All the funds were subsidized by the Company, and their stability guaranteed. In the South Metropolitan Company there were, in round figures, 5000 men regularly employed, and this number was increased by about 1000 in the winter. For the South Suburban Company, the figures were about 500 regularly employed, and another 100 in the winter. As to wages, at the time of the Labour Commission he found the average was about 33s. a week; at present, it was from 34s. to 35s. In the case of the sick and burial fund the deduction would be 3d. per week; for the superannuation fund, 3d. or 6d. a week, whichever the men liked, according to the rate of superannuation; and for the accident fund, 2d. per month, or ½d. per week. On the average, therefore, there was a deduction of 6½d. a week. The figures he was quoting were all for 1905. To the sick and burial fund 5083 workmen that year paid £4978; and the Company, £1895. The Company, in the case of this fund, made up the deficiency, whatever it might be, year by year. To the superannuation fund 4100 men subscribed £2834, and the Company £4278. The Company gave 4d. a week to the men's 3d., and also guaranteed that the capital of the fund, the accumulated amount, should be invested to pay 5 per cent. It was invested in the Company's own stock, which only paid a little over 4 per cent.; and the Company therefore added a certain amount each year to the accumulations, in order to realize 5 per cent. on the balance or yearly surplus. To the accident fund 6051 men contributed £548; while the Company's share was rather more than double, or £1187. The Company paid 4d. a month on the maximum number of men employed each quarter. Of course, many gas companies gave pensions to worn-out workmen, but there might be nothing definite about it; and one reason why they started their superannuation fund was to put the pensions on a definite basis. Another reason was that when men had been a long time in the service the Company did not like to turn them away. They had got past work; but they were kept on at the ordinary wages, or at reduced wages, when they could not earn the money. He believed it was better for the Company, and to some extent a saving, for them to have a fund by which they could superannuate the men at a certain date. The accident fund was in advance of the Compensation Act; and he thought the Company's scheme was infinitely better than simple dependence on the Act of Parliament. One of the best evidences of this was the fact that the men were unanimously in favour of it. He was also sure it helped to prevent accidents. At the starting of the fund in 1898, their accidents amounted to 69 per 1000. By means of the fund bringing them into touch with the men and getting their co-operation for the purpose of preventing accidents, it had come down year by year; and last year they were 34 per 1000. The number was reduced by one half. This was counting every accident that incapacitated a man for three days. Then a unique feature of their scheme was that every accident was inquired into by a jury of twelve workmen, who ascertained who was in fault and what could be done to prevent a similar occurrence in future. Any man who wished could sever his connection with the funds. In the case of the superannution fund, the money was returned to the extent of two-thirds of what they had paid after they had subscribed ten years, which entitled them to benefit in the event of incapacity or infirmity. Subscriptions for less than ten years were returned in full. In the sick and burial fund, seeing that there was no accumulation, and the man's contribution was not sufficient to cover his risk for the year—and in the same way with the accident fund—nothing could be returned. He did not think any way so good as this could be found to induce working men to save. Then the Company also had a system by which men could request the pay clerk to stop any amount decided upon from their weekly wages; and such sums were placed to their account with the Company. The money was always available at a week's notice; and £12,000 was about the amount that was yearly stopped from the men under this arrangement. About half of this was permanently saved—perhaps more. When at the time of the Boer war about 140 of the Company's men were called out as reservists, the men started a fund to provide for their wives and families. They asked the Company to collect a weekly sum of 2d. from each man; and the Company gave a similar amount. In this way, over £3000 was raised by the men, and a like sum contributed by the Company. If Parliament declared illegal all such deductions from wages as he had been referring to, the men would, he thought, greatly regret it. It would be a saving to the Company in one way, but a serious loss in another. All these funds that brought them into intimate association with the workmen tended to promote a friendly feeling, and what they were most anxious for—the principle of co-partnership, to make them all work together. Abolish these funds, and everything of the kind, and they would come to this—that there were so many hours' work, and so much pay, and that was all between the employer and the employed. A great many companies had sick funds; but very few possessed superannuation funds—they could probably be counted on the fingers of two hands. As to auditors, two were appointed—one by the Directors, and the other by the men.

In reply to a series of questions by Mrs. Tennant, witness said that the benefits in the Company's sick and burial fund were much higher in proportion to the contributions than was the case with the big friendly societies. The men had inaugurated on their own account certain benevolent funds—starting with the Hospital Saturday fund, 1d. per week; but such difficulty was found in collecting these pennies that

they asked the Company to undertake the work. Altogether in the year 1906 £20,886 was stopped from wages, out of a total bill of (say) £450,000.

Replying to Sir F. Cawley, witness said they had no fines at his works; but if a man came late, he was sometimes sent away until after breakfast, which, of course, was equivalent to a fine. Asked whether he thought it a fair thing that Parliament should say there shall be no fines at all for any offences, he said he believed it would be a disadvantage to the workmen themselves. Employers would say then, "Very well, if you prohibit all these fines, we will simply discharge the men."

Sir George concluded his evidence by giving some particulars with regard to the co-partnership scheme of the two Companies—a matter in which the members of the Committee displayed very considerable interest.

THE PRICE OF GAS IN SOUTH LONDON.

Lambeth Borough Council and the Gaslight and Coke Company's Bill.

At the Meeting of the Lambeth Borough Council last Thursday, the Town Clerk (Mr. H. J. Smith) presented a report on the Bill of the Gaslight and Coke Company, the scope of which has been fully indicated in the "JOURNAL." After going in detail into the various clauses, he said there was one point that should be considered—viz., whether clause 39 of the Scheme of Amalgamation between the London Gas Company and the Gaslight and Coke Company should not be revived now that the Company asked that the illuminating power of their gas should be reduced from 16 to 14 candles. By the clause referred to, it was provided that the Company should not charge in their district south of the Thames a higher price for gas, either for public or private lighting, than that for the time being charged by the South Metropolitan Gas Company for gas of the same illuminating power. At that date (1883), both Companies were bound to supply gas of 16-candle power; but by the South Metropolitan Company's Act of 1900 they were allowed to reduce their power to 14 candles, which, in effect, freed the Gaslight and Coke Company from the obligation referred to; and the Counsel for the Company, when appearing before the Board of Trade in the Lambeth Council's arbitration in 1902, contended that the engagement made under the Scheme of Amalgamation was no longer binding, as the two Companies did not supply gas of the same candle power. When the Company were before the House of Commons Committee in connection with the application for their Act of 1903, the Council asked that the obligation should be revived; suggesting an allowance of 1d. per candle for each candle above or below the illuminating power of the gas supplied by the South Metropolitan Company. Mr. J. W. Field, the then Secretary and General Manager of the Company, admitted in the witness-box that the Company, if legally exempt, were honourably bound to continue the concession; but their Counsel objected to their being bound in the Bill to grant it, particularly until it was seen what would be the report of the Departmental Committee of the Board of Trade who were then inquiring into the expediency or otherwise of reducing the illuminating power of gas below 16 candles, and the effect of such reduction. Counsel undertook, however, that the Borough Council should not thereafter be prejudiced in again applying for the clause when the Company next went to Parliament. The House of Commons Committee decided that, under the circumstances, it was not necessary to insert the new clause asked for by the Council; and the Bill passed without it. The Company now sought to reduce their illuminating power, and if this were sanctioned they would be supplying gas of the same quality as that of the South Metropolitan Company. Under these circumstances, it appeared to be only right and proper that the restriction contained in the Amalgamation Scheme should be revived, as it was strictly on this condition that the Gaslight and Coke Company were allowed to absorb the London Company's district south of the Thames. The Town Clerk added that it might be that, if Parliament should sanction the proposed reduction, the old clause would be *ipso facto* revived; but there should be no doubt on such a question, as it was very important, not only in respect of the cost of the public lighting, but also for the benefit of the whole of the private consumers in the Company's district south of the Thames. If the illuminating power should not be reduced, there should still be some obligation put on the Company binding them to the old restriction, with an allowance for any difference in candle power. The objections raised by the Company's Counsel in 1903 did not now apply, as the Board of Trade Committee had long since reported; and the report was evidently satisfactory, or the Company would not now be seeking to reduce their illuminating power. As the Company were asking for benefits from Parliament, they should be bound to revive, in some form or other, what Mr. Field considered they were honourably bound to perform. It might be mentioned that ever since 1903 the Company had made a charge for gas for public and private lighting of 2d. per 1000 cubic feet more than that of the South Metropolitan Company—being, in effect, 1d. per candle difference in illuminating power.

The General Purposes Committee intimated that they had considered the foregoing communication, and recommended that the Town Clerk should apply to the Company for the insertion in the Bill of a clause to the effect that they should not charge in their district south of the Thames a higher price for gas than that for the time being charged by the South Metropolitan Company for gas of the same illuminating power; and that, failing to receive a satisfactory undertaking for the insertion of the necessary clause from either the London County Council or the Company, he should be authorized to prepare, seal, and lodge a petition against the Bill of the Council or the Company so declining.

The recommendation was adopted *nem. con.*, and without discussion.

According to a paragraph in the "Daily Express," experiments have been made at Hounslow with the "Sylverlyte" lamp, the light of which is guaranteed to penetrate the murkiest fog. An electric bulb fits into the powerful lens of the lamp, which is reported to magnify its 12-candle light to one of 12,000-candle power.

POSITION OF THE AMMAN VALLEY GAS COMPANY.

We have received from a Committee of Shareholders in the above-named Company, consisting of Messrs. Sam Cocker, E. J. Field, and John Miller, the following statement, signed by them, in regard to its position. They say the history of the promotion of the Company will, no doubt, in due course, be made public; but, in order that the shareholders may be enlightened as to what has taken place, they present to them a few facts, all of which can, they say, be readily verified at Somerset House or from the Company's books.

The promotor of the Company was Edmund Eaton, of 99, Cannon Street, London. In September, 1904, he registered the Gas and Water Works Supplies and Construction Company, Limited. In March, 1905, he registered another Company under the title of the Water and Gas Debenture and Share Investment Trust, Limited.

On Oct. 24, 1905, an agreement was arranged by Eaton with the Ammanford Council, under which the Construction Company undertook to supply gas for the lighting of the urban district. By clause 15 of the agreement, the Council could, at their discretion, discontinue the lighting of the lamps; and by clause 20 either party could terminate the agreement by three months' notice in writing, but without prejudice to the Council's right to purchase the Company's undertaking within 21 years, under clause 18.

The Amman Valley Company was registered on Nov. 22, 1905. An agreement was made between the Construction Company and the Amman Valley Company on Jan. 8, 1906, by which it was provided: (1) The Construction Company were to construct the gas plant—as specified in a schedule—on land to be provided by the Amman Valley Company within eighteen months. (2) The Construction Company were to be paid £10,000 in cash on or before Feb. 1, 1906; £3500 in cash on or before March 14, 1906; £500 on the completion of the works; £2000 fully-paid ordinary shares, and £2000 fully-paid preference shares on the signing of the agreement. Under this agreement, therefore, the Construction Company (otherwise Eaton) was to receive an immediate payment of £17,500 in cash and shares, though the works were not to be completed for eighteen months! It is stated that if the Urban Council had carried out the works themselves, it would have cost £7000. But this would have been for a complete system of supply; whereas, under the agreement above mentioned, £18,000 was to be paid for works on leasehold land and only three miles of mains. (3) Possession of the gas-works was not to be given to the Amman Valley Company until payment of the final balance of the purchase-money; and it is believed that such possession has never been given. An agreement dated Jan. 8, 1906, was also entered into with the Debenture Company (Eaton's other Company), whereby the Debenture Company agreed to "issue 100,000 *or less* prospectuses," and were to receive all cash expenses *plus* 10 per cent. of all moneys received by the Amman Valley Company on shares allotted to the public.

These agreements were ordered to be sealed by the Amman Valley Company at a meeting of Directors on Jan. 8, 1906, at which Eaton was in the chair, and the other Directors were F. W. Morton and A. Schofield (Director of the Debenture Company). At the same meeting it was resolved that Mr. Eaton be paid £100 per annum for services of Secretary and Offices. One hundred ordinary shares were ordered to be transferred from the Construction Company to A. Schofield, though at that time no shares had been allotted.

The prospectus was dated Feb. 3, 1906, and was issued shortly afterwards. The result of the issue was that 5151 ordinary shares and 4315 preference shares were applied for, and about 400 debentures of £10 each. The shares were £1 each; and as 10s. per share was payable on application and £5 in respect of each £10 debenture, the Company received on application nearly £7000, and have received altogether in cash about £13,466.

A meeting of the Directors was held at Eaton's office on Feb. 23, 1906; Eaton being in the chair. The signing of the following cheques was confirmed: Gas and Water Works Supplies and Construction Company, £150 on account of promotion; Water and Gas Debenture and Share Investment Trust, £100, £500, £100, £500, and £250 on account of issue; and Horncastle's, Limited, £100 on account of advertising. At the same meeting the following cheques were signed: £2500 on the purchase agreement due at once; £2500 on ditto, post-dated seven days; and £1000 on account of issue.

The shareholders' money having been handed over to Eaton's Company, the utmost difficulty was experienced in getting the Construction Company to construct the works or perform their part of the contract; and on Jan. 16, 1907, a meeting of the Board was held, in the minutes of which the following appears: "After considering the position of the Company, it was decided that the Secretary write Mr. Eaton at once, stating the Directors were surprised and sorry that he had again failed to meet them, and the Chairman inform him that unless he will meet the Directors here to-morrow (Thursday) or Saturday, the 19th, at any time to be fixed by him, with a view to placing the affairs of the Company upon a proper basis, the Directors will immediately place the whole of the affairs connected with the Company in the hands of a firm of solicitors to be agreed upon."

The eighteen months within which the works were to be completed expired on July 8, 1907; but the works were not completed nor the mains laid. Shareholders will remember that there was a grand opening of the works, with Mr. Abel Thomas, K.C., M.P., in the chair; but no supply of gas was then or has since been given in the district. The opening ceremony, on Nov. 23, 1907, was celebrated by a banquet; Mr. Eaton being in the chair, and Mr. Abel Thomas proposed the toast—"Success to the Amman Valley Gas Company, and to the district in which it was started." He coupled with the toast the name of Mr. Eaton, who, he said, was the father of the undertaking, and who to a very large extent had brought it into existence; and he hoped the Company would have many years of prosperity.

Proceedings are being taken against Eaton and others by a share and debenture holder for the recovery of his money, on the ground of misstatements in the prospectus; and we do not therefore comment on the terms of that document. Using the very mildest language, the Amman Valley Company has been grossly mismanaged, and the shareholders'

money has been used largely for purposes other than the construction of the gas-works at Ammanford. The shareholders' money has gone; the works have been put up on leasehold property; and the landlord will re-enter if the rent is not paid. The Ammanford Council claim to rescind the agreement, and will not allow the Company to lay its mains. No gas is being made or supplied; and the Company is believed to be still in debt to the Construction Company.

The Amman Valley Gas Bill is being promoted nominally on behalf of the Amman Valley Company to compel the Ammanford Council to allow the mains to be laid; but by the Bill the first Directors are to be Eaton and a friend of his and Mr. Hubert Russell, who is the Manager at the works. The Secretary of the Company is a clerk in Eaton's office.

Is it not time that the Company was freed from this Eaton influence, and that the shareholders elect their own Directors, and endeavour, out of what remains, to build up a concern which shall be conducted on businesslike principles, and that an endeavour be made to make the Construction Company refund some of the shareholders' money? It is with this object that the Ammanford Gas Bill has been promoted; and we trust it will have your support. By the Bill it is proposed: (1) Each shareholder will get the same holding in the new Company, to be called the Ammanford Gas Company. (2) The fully-paid shares given to the Construction Company will be cancelled. (3) The fair value of the gas-works is to be ascertained by arbitration, and any excess recovered from the Construction Company. (4) Power will be taken to lay all mains and give a proper supply of gas in Ammanford and Llandebie. (5) The Directors will be *bonâ fide* shareholders, and the undertaking will be carried on for the benefit of the shareholders. (6) Sufficient capital will be raised to carry on the undertaking.

Under the circumstances set forth above, the signatories confidently ask the shareholders to sign and return to them two enclosed documents—one being a requisition to alter the Articles of Association so as to remove the present Directors and appoint *bonâ fide* shareholders as Directors in their stead; and the other a form of proxy to be used at the meeting of the Amman Valley Company at which the Bill appointing Mr. Eaton as Director will be submitted for approval. They point out that they are themselves *bonâ fide* shareholders, having invested money in this unfortunate undertaking; and they trust the trouble they are taking will be appreciated by the shareholders generally, who they hope will give them their unanimous support.

MANCHESTER AND LIVERPOOL GAS UNDERTAKINGS.

Comparative Statistics.

Over the signature of "A Member of the Manchester Gas Committee," a correspondent of a Manchester contemporary supplies statistics concerning the Manchester and Liverpool gas undertakings for the sake of comparison. The figures given are the latest available. They are tabulated below:—

	Manchester.		Liverpool.
Capital	£2,700,770	..	£1,986,974
Candle power	17·53	..	20·20
Cost per 1000 cubic feet	1s. 5·00d.	..	2s. 0·19d.
Price charged	2s. 3·36d.	..	2s. 6·04d.
Gross profit	10·40d.	..	6·77d.
Meter charge per quarter	*Nil*	..	About 9d. per consumer
Total value of works, &c.	£2,993,514	..	£1,986,974
Total liabilities	1,376,296	..	—
Excess of liabilities over assets	1,617,218	..	—
Total liabilities, &c., per million cubic feet of gas produced	£238	..	£472
Length of mains, miles	912½	..	878
Number of consumers	170,938	..	121,464
Annual make of gas, 1000 cubic feet	5,779,256	..	4,205,706
Output of gas per mile of main, 1000 cubic feet	6,333	..	4,790
Price charged per 1000 cubic feet—			
Ordinary consumers	2s. 3d.	..	2s. 6d. net
Engines	1s. 9d.	..	2s. 6d. ,,
Automatic meter consumers	2s. 9d.	..	3s. 4d.
Paid in aid of rates since the works were taken over	£2,858,585	..	—

The points in which Manchester excels, according to the correspondent, are as follows: Manchester grants free to the customers both ordinary and automatic meters, gas cookers, grillers, and boiling burners; its works costs are the lowest; the cost of management is the lowest; the value of the concession in meter and stove rents as compared with Liverpool is about £20,000 per annum; and £60,000 was applied in aid of rates last year. A point of the disadvantage in connection with Manchester, compared with Liverpool, is given as "excess of cost of rates and taxes."

It is added that the total additional sum which Manchester gas consumers would have to pay, supposing the gas-works were run by a company and worked at the same level of expenditure as Liverpool, would in the year under review have been upwards of £235,000.

New Issues of Gas and Water Capital.—It will be seen, from an announcement which appears elsewhere, that Messrs. A. & W. Richards have received instructions from the Directors of the Great Yarmouth Water Company and the Alliance and Dublin Consumers' Gas Company to offer for sale new issues of capital, and that this will be done at the Mart, Tokenhouse Yard, E.C., next Tuesday. The Water Company's issue consists of £4000 of new ordinary stock and £1000 of 4 per cent. perpetual debenture stock; that of the Gas Company being a sufficient number of ordinary £10 shares to realize, with premiums, a net amount of £37,045. To-morrow afternoon, Mr. W. J. Place will offer for sale at Nottingham 1080 preference shares (5 per cent.) of £10 each in the Draycott Gas Company; being part of the additional capital authorized by the Company's Act of last year.

CAGLIARI GAS AND WATER COMPANY.

Voluntary Winding Up.

An Extraordinary General Meeting of the Company was held last Tuesday, at the London Offices, No. 11, Ironmonger Lane, E.C.—Mr. JOHN AIRD (in the absence, through ill-health, of Sir John Aird) presiding. The object of the meeting was to consider the question of the voluntary winding up of the concern, under circumstances explained in the course of the proceedings.

The SECRETARY (Mr. W. P. Peat) read the notice calling the meeting, including the following resolutions:

(1) That the Company be wound up voluntarily.
(2) That Mr. William Barclay Peat and Mr. Sophus Simmelkjor, both of 11, Ironmonger Lane, in the City of London, be and are hereby appointed Liquidators of the Company for the purposes of such winding up, and they are hereby authorized to adopt and carry into effect the provisional agreement dated the 21st day of November, 1908, for the sale of the Company's business and undertaking to the Municipality of the City of Cagliari.

The CHAIRMAN said he should like to remark that, according to the Articles of Association, there should be one-tenth of the votes present, and he was glad to say they had that proportion, so that the meeting was legally constituted. He desired also to remark how much their Chairman (Sir John Aird) regretted that he was not able to be present. This was owing to his ill-health; and he had asked him to tell the shareholders that it caused him great sorrow that he was not able to take the chair at this extraordinary meeting of the Company, with which he had been so long associated, and of which he was so proud. He (the Chairman) therefore asked the shareholders to accept Sir John's excuses. Turning to the business of the meeting, as the shareholders were aware, the gas concession lapsed on Feb. 23, 1908; and at the request of the Authorities, an extension of one year was agreed to. Negotiations for a renewal had been going on for several years previous to 1908. In December, 1904, Mr. Simmelkjor and he (the Chairman) went to Cagliari to submit a scheme to the Municipality, which provided for a renewal of the gas concession and the settlement of some questions in reference to the water-works which had been long outstanding. The principal of these questions arose out of a claim on the part of the Municipality to the effect that the Company were under obligation to carry out extensions. It was obvious that after 40 years' service, and in view of the great increase in the population of the city of Cagliari, the works required extensions to meet the ever-growing demands of the city. The Board had had the opinion of some of the most eminent Counsel in Italy, who informed them that the Company were not responsible to make these extensions. On the other hand, the Municipality had had the opinion of some equally eminent gentlemen, whose views were to the contrary, and intimated that, in their opinion, the Company were under obligation to execute at their own cost all the extensions required during the 90 years of the concession. Regarding the gas-works, the concession had lapsed; and the general inclination in the City of Cagliari was strongly against granting to them or any company a new concession. The Directors were informed that the Syndic had been authorized by the Town Council to engage Mr. Sospisio, the Manager of the Trieste Gas-Works, to prepare plans and estimates for a new gas-works in Cagliari. Had these works been built, the Company's works would have been the value of old iron; and while the Municipality could perhaps not compel them to pull down their works and take up their mains, they could not only charge them a heavy duty on gas, coal, and coke, but could make them pay a ground-rent for occupation of the public soil for the mains, and so make it quite impossible for the Company to compete with the municipal gas-works. Under these circumstances, the Directors were obliged to come to the conclusion that it would be futile to continue the negotiations for a new gas concession; and, with the consent of the Directors, Mr. Simmelkjor approached the Syndic with the view of selling the whole of the Company's property, rights, and privileges to the Municipality. There were, as the shareholders would understand, many difficulties to be overcome; but with regard to the gas-works, the matter was simple, as the contract was made between the Company and the Municipality only. In the case of the water-works, however, the convention was not only between the Municipality and the Company, but between the Municipality of Cagliari, the Province of Cagliari, and the Italian Government; and the convention authorized by Act of Parliament. The suggestion as to a sale of the undertakings was, on the whole, well received by the Syndic, and also by the prominent men in the city; and the negotiations were continuous until Nov. 21, 1908, when the provisional agreement was signed, which had since been approved by the Town Council and the Board of Directors. It now remained for the shareholders to give their consent. The Provincial Council would meet before the end of this month; and a Bill was before the Italian Parliament, and would be discussed as soon as the sittings commenced after the vacation. As the Bill was what was called a non-political measure, it required only one hearing, and no opposition was expected. As intimated in the circular annexed to the notice calling the meeting, the shareholders would receive about £26 for each share; and besides this they would also get the usual dividend in March. The Directors were of opinion that this was a very satisfactory result, and recommended the shareholders to sanction it. He could not conclude these observations without expressing the obligations of himself and his co-Directors to their colleague, Mr. Simmelkjor, for his invaluable assistance in arranging terms with the Municipality, which was only possible because of his intimate association with them for a period of 25 years as the Company's representative in Cagliari, and the fact that he remained, during the whole of this time and since, on good terms with the authorities. He also wished to specially mention and acknowledge the services that had been rendered by Mr. Sanna, the Company's present representative in Cagliari. In the same connection, the Directors had much reason to express their thanks not only to these two gentlemen but to the whole of the staff in London and Sardinia—particularly to their good friend Mr. Peat. Nor must he forget Mr. Webster, the Gas-Works Manager, under Mr. Sanna. It

was a pleasure to him (the Chairman) to be able to acknowledge the harmonious working of all their officers and their disinterested services to the Company during the long period of its existence. Mr. Peat had kindly offered to give any further explanation or information the shareholders might wish for. He formally moved the first resolution.

Mr. F. W. BLUNT seconded the motion.

Mr. G. F. THOMPSON thought the Directors had done a wise thing in coming to terms; but it seemed to him that the shareholders were entitled to a more detailed explanation. The circular said that about £26 would be returned to the shareholders. He should have liked to have seen it stated that no less than £26 would be returned.

Mr. T. P. POWELL asked when the shareholders might expect to receive the £26.

Mr. H. J. PFUNGST expressed approval of the action of the Directors, who had done extremely well for the shareholders. The only question he should desire to ask was, Were any of the Company's officers remaining with the Municipality? He raised the question as he noticed the Directors intended to make some allowance to the staff. Some allowance was also included for the Directors themselves. The Directors had done their duty to the shareholders. He supposed, however, they had drawn fees in the past; but did they now intend to draw fees for work they would not do, seeing that the Company would cease to exist?

Mr. A. TOOTH inquired whether the arrangement, when concluded, contemplated merely the purchase money or the purchase money and the reserve and other funds set aside from time to time.

Mr. PEAT, in reply, said the provisional agreement was before them; and it was between the Company and the Municipality. The Province of Cagliari had already, according to a telegram lately received, approved of the agreement; and it now remained only for the Government to consent. This was the subject of a Bill at present before Parliament. It was possible enough that some little delay would take place, because he believed that the recent distress in Messina had rather tended to a little bit of delay in the parliamentary procedure in Italy. However, they could only hope for the best in regard to it. The amount payable by the Municipality was £155,000; and it was due on the Company giving them possession of the works on Feb. 23, providing that all formalities had been got through in the meantime—such, for instance, as the Bill passing the Italian Parliament. In the event of its failure to pass, some other arrangement might be proposed by the Municipality which the Company might be ready to accept. But he could not say anything about this at present. However, the money was not payable until they gave possession; and the Board anticipated—indeed, they were hopeful—of giving possession on the 23rd of next month.

Mr. THOMPSON: And you profit by the working until then?

Mr. PEAT: No, sir. Under the terms of the agreement, the Municipality take over the working from Jan. 1.

Mr. THOMPSON: But supposing the settlement drags on for a period. I have had a little experience in another Company where there was a delay of something like eighteen months.

Mr. PEAT replied that that was just the point they were most anxious to avoid. It was in the minds of the Directors; and it caused them, if anything, some anxiety. They hoped to avert delay, and were hopeful there would not be any. It was necessary to tell the shareholders that up to that day they had not all the assents. With regard to the Company's officers, he believed some of them would be taken over by the Municipality, and he should imagine many of them would not be. There was no contract for the Municipality to take over a single member of the staff. Another question was as to whether the reserve funds and the sinking funds were in addition to the purchase money. The answer was in the affirmative. The Company had, of course, to pay their debts out of the purchase money, *plus* the reserve and sinking funds. But he had no doubt whatever that the £26 per share would be forthcoming. The Directors would not have put it in the circular if there had been any question in their minds.

Mr. TOOTH asked whether it was expected there would be a surplus for the past year, as there was for the previous one.

Mr. PEAT answered that the dividend up to Dec. 31 would be at the usual rate of 8¼ per cent. per annum. The profit in the previous year was sufficient to allow of £1000 being carried to the reserve fund; and the Board imagined that the profits of the past year would run to about the same figure. But the £1000 would merely form part of the reserve and sinking funds, *plus* the purchase money, *minus* the debts of the Company; and the balance would form the subject of division.

Mr. PFUNGST observed that the servants of the Company and the Directors should be compensated; but he did think the shareholders ought to be aware of the amount which was to be set aside for the servants who did not receive employment under the Municipality, and for the Directors who were also giving up their employment. He did not ask this in any hostile spirit, but as a business man.

Mr. PEAT replied that, so far as the staff were concerned, the Directors would do as they had always done hitherto, consider the merits of each individual and his necessities. As to the remuneration of the Directors, some of them had for 40 years been giving their services to the concern. It must be considered, he thought, a very disinterested action on their part to make an arrangement of this character, whereby, in trying and somewhat dangerous times, the shareholders realized such a (as he personally thought) very good bargain. The amount that it would be possible to give the Directors would entirely depend upon what might be finally realized. He did not think it would be possible to make any distribution to the Directors unless it was sanctioned by the shareholders. When they had the money in hand, it would be sufficient time to lay a proposition before the shareholders.

Mr. PFUNGST considered the number of years' compensation the Directors thought they should receive might be stated. He quite agreed that they had a perfect right to claim something, seeing the services they had rendered for so many years.

Mr. PEAT said he could not possibly answer the question.

The motion was unanimously carried.

Proposed by the CHAIRMAN and seconded by Mr. W. R. GALBRAITH, the second resolution (already quoted) was similarly adopted.

Moved by Mr. THOMPSON and seconded by Mr. PFUNGST, a hearty vote of thanks was passed to the Chairman and Directors for what they had done in this matter, and for their services over so many years.

Mr. TOOTH said he thought they ought to specially express their thanks to Mr. Simmelkjor. The negotiations conducted by him required a great deal of tact; and there was no question at all about the bargain made.

The suggestion was at once cordially endorsed.

The CHAIRMAN thanked the shareholders on behalf of himself and his colleagues for the kind words that had been uttered. They all parted from the Company with great regret. They had been a happy little band. They had always kept together, and had ever tried to pay good dividends. With other shareholders, they would be equally sorry to lose their holding in such a Company.

Mr. SIMMELKJOR also made a brief response.

This terminated the proceedings.

POWER GAS CORPORATION, LIMITED.

The Eighth Ordinary General Meeting of this Corporation was held at the Westminster Palace Hotel on Monday last week—Mr. ALFRED MOND, M.P., in the chair.

The SECRETARY (Mr. Wilfrid Beswick) read the notice convening the meeting, and also the report of the Auditors.

The CHAIRMAN, in moving the adoption of the report (*ante*, p. 128), said the result of the year's trading was a profit of £2407, compared with a debit balance of £2929 for the previous twelve months. The general engineering business last year was very bad; and the Corporation suffered from the engineering strike on the north-east coast. In regard to their power-gas business, there had been a satisfactory development in the export department, which continued for a large part of the financial year. They had erected the first large gas-power plant in China—at the Hong Kong Dockyards. It was a 6000 H.P. plant, which was working the dockyards by means of gas-engines and electricity, and also supplying heat to the furnaces. In Japan, they had erected a 3000 H.P. plant for a paper-mill; and they had also received an order for a plant from the Japanese Arsenal. He was glad to say that both the plants were working satisfactorily. During the year they had shipped to India the first two bitumen gas plants which had ever gone to that country. With regard to the business at home, last year he spoke about the Langwith bye-product plant—a large producer plant which they were putting up, in conjunction with the Sheepbridge Coal and Iron Company, for the purpose of producing gas and bye-products. They expected the plant would have been completed within the past financial year; but a good many delays had occurred, largely due to the difficulty of obtaining the site required. He believed the plant would be finished in a relatively short time. There were a considerable number of very important inquiries pending, and one satisfactory feature was that municipal engineers of large corporations were beginning to take a more earnest interest in the question of generating electricity by large gas-engines than they had done in the past. It might interest the shareholders to know that in connection with the South Staffordshire Mond Gas Company the Wednesbury Corporation were generating all their electricity for the town from Mond gas used with gas-engines. Another subject which had been attracting a good deal of attention recently was the utilization of peat in gas-producers for the making of gas, and also for the recovery of sulphate of ammonia. This was a subject on which Dr. Mond began to work a good many years ago; and at the present moment the Corporation were erecting three plants—one in Italy, another in Germany, and the third in England—for the utilization of peat for the manufacture of gas and sulphate of ammonia. The Directors had taken up the question of suction-gas plant; and arrangements had been made to acquire the business of the Mersey Company, which had been carried on in Liverpool, and transfer the manufacture of the plant and sales to their Stockton works.

Mr. E. LLOYD PEASE seconded the motion.

Sir ISRAEL HART remarked that, having regard to the large amount of capital employed, the profit of £2000 odd was very disappointing. Even this, as was apparent from the Auditor's report, was shown before anything had been written off for depreciation. There was now an uncalled liability of £16,000 in respect of shares in other companies, which was a very serious matter. When the prospectus was issued, they were led to believe that the business would be a prosperous one; but now they had to go to all parts of the world for orders to keep their shops going, without anything being said about profits.

Mr. PAUL said it was disappointing to have no dividend; but they might congratulate the Board on having carried through the reduction of the capital, and also on having earned a small profit.

The CHAIRMAN having replied, the motion was carried *nem. con.*; and the proceedings closed with a vote of thanks to the Chairman.

Water-Works Disaster on Lake Michigan.

The "Daily Chronicle" last Thursday contained an account from the correspondent of that paper in Chicago, of a terrible disaster which occurred the previous afternoon at the new "crib" which is being constructed on Lake Michigan in connection with the additional water-works for Chicago. The superstructure of the "crib" over the intake tunnel caught fire while one shift was working and the men in the relief shift were asleep; and 50 lives have been lost—some being drowned, others burned. The new "crib" under construction is about four miles off the shore; and its capacity was to be about 70 million gallons a day. Owing to the magnitude of the work, something over 100 men were employed. By some unexplained means, the structure, which was made of wood, caught fire—it is thought from the kitchen or the workshop—and rapidly burst into flames, which enveloped the whole building. In the shortest space of time the flames surrounded the sleeping-room, where forty men off duty were in bed. The day-shift men were in the tunnel, and consequently the life of every one on the premises was menaced. The barriers holding the water back were quickly destroyed by the fire, and the tunnel, which has a diameter of 9 feet, was flooded. Men were working near the bottom, finishing the connection between the intake and the tunnel, and for them there could be no hope of escape. Twenty were drowned, and their bodies afterwards recovered.

THE FATAL GAS EXPLOSION IN BERMONDSEY.

Resumed Inquest on the Second Victim.

Last Wednesday, Dr. F. J. WALDO, the Coroner for the south-eastern district, resumed the inquiry, opened on the 6th inst. (see *ante*, p. 119), into the circumstances attending the death of George Henry Langley, which occurred in Guy's Hospital on the preceding Saturday, as the result of injuries caused by the explosion in Grange Road, Bermondsey, on the 30th ult.

Mr. CLAVELL SALTER, K.C., M.P., appeared for the South Metropolitan Gas Company; Mr. J. W. GODFREY represented the London County Council, and Mr. T. B. SHAW the Metropolitan Water Board; Mr. F. RYALL, the Town Clerk of Bermondsey, was in attendance for the Borough Council.

Herbert Boot, a fitter in the employ of the Company, was the first witness called. He repeated his former evidence (see *ante*, p. 49); adding, in reply to Mr. SALTER, that he had not used any naked light near the main, it being forbidden by the Company, and also that before the explosion occurred no leakage of gas was detected.

In answer to a question put by Mr. RYALL, witness said the electric street-lamps were alight after the explosion occurred.

Mr. *J. H. Hazell* deposed that he was passing with his wife along Grange Road on the night of the explosion. They were walking past No. 129, when his wife called his attention to the fact that a man was standing by a hole in the ground swinging a lighted rope in such a manner as to cause a circular flare, apparently, as he (witness) thought, to get a better light. He crossed the road at No. 43, and shortly afterwards heard a loud report and saw all the earth in front blow up. He and his wife were thrown back against the railings of a house. He saw no flames whatever; all he saw was what appeared to be a white mist. He heard three explosions, the second being about three-quarters of an hour after the first, and not long after that a third.

Mrs. *Hazell* was called, and she corroborated her husband's statements.

Mr. *E. A. Miller*, of 33, Grange Road, stated that he was in his shop when the explosion occurred. He went to see what was the matter, and outside met Toomey, who remarked that it was a wonder that he had not been blown up. Witness asked him what he meant, and was told that there had been an explosion up the road. He went to see what it was, and when he came to the place where the explosion had occurred, he saw a man standing over a hole holding his head.

Replying to Mr. SALTER, witness said he did not see any lamp on the pavement, but saw one on the palings. He added that he did not see any tarred or lighted rope, or any naked lights.

Lockley and *Marney*, in the employ of the Gas Company, repeated in substance the evidence given by them at the first inquiry.

Mrs. *Esther Barnes*, of 39, Grange Road, who had been specially sent for by the Coroner, stated that about 4.30 p.m. on the 30th of December some men started work outside her house. Later on she saw one of the men looking down a hole they had been digging. Though it was somewhat foggy, she was able to see one of the men with a light in his hand. This light was in the form of the lighted end of a piece of rope. On this point witness was certain. She heard the explosion which occurred at about 8.30 p.m.

In answer to Mr. GODFREY, witness again expressed her absolute certainty that one of the men was stooping over the hole with a piece of lighted rope in his hand.

By Mr. SALTER: The men were at work at the time of the explosion. She distinctly saw the man moving a light about.

George Rose, a fitter in the employ of the Company, stated that about 5 p.m. on the night of the occurrence, as he was passing through Grange Road, he detected a slight smell of gas outside No. 39, and subsequently reported it to an order clerk named Piper in the Company's service.

This evidence was confirmed by the person named.

Colonel *Charles Fox*, the Chief Officer of the London Salvage Corps, spoke to receiving calls to attend at Grange Road on the 30th of December. When he arrived he smelt gas very strongly throughout the road, but principally in front of the Mason's Arms public-house. Evidence showed that there had been very violent explosions. At present there were no means of cutting off the gas from any street. It could be done, he thought; but it would be a very costly job. He recommended that it should be done in the laying of new mains. The Gas Company's officials arrived some time after the explosions; and he ventured the opinion that if the gas companies instituted breakdown or emergency gangs, as was the practice on the railways, many lives that were now lost could be saved. Asked what he thought was the cause of the explosions, he said the hard frost just previously might have caused the water-pipe, or even the gas-pipe, to burst. As to the means of ignition, he said he was very much struck by the evidence of one of the witnesses, who stated that stringent orders were given that no tarred rope was to be used in any explosions. It gave one the impression that it was sometimes employed for lighting purposes. The gas might also become ignited from a spark from a pick striking a stone. He had known of such a case.

Replying to the CORONER, witness said he was of opinion that all disused sewers should be filled up. They became full of foul air, and offered a convenient storage for escaping gas.

Mr. *Robert Maynard Gloyne*, District Engineer to the London County Council, said the old sewer in Grange Road was made prior to 1855; and the new one was put in about 1881 or 1882. He was of the opinion that the first explosion occurred at No. 52. He did not see any objection to the disused sewer being there. Asked to state what, in his opinion, was the cause of the explosion, witness said it was obvious that coal gas had got into the old sewer, and the cause was the fractured "rider" main. It was an old fracture, and he had formed this opinion because the rust was very thick and of a deep colour. The "rider" was fractured because of the heavy traffic in Grange Road. It was not broken at a joint, but between joints. In his opinion, the old sewer should not be allowed to remain; it should be filled up.

Replying to Mr. SALTER, witness said he considered the cavity in Grange Road had been made by the explosion, and the earth had gone into a portion of the old sewer. The explosion caused the collapse of the end wall of the chamber. He did not think that it was remarkable that the force of the explosion had not disturbed the setts of the roadway. It found the weakest spot.

Two other witnesses stated that they saw men at work in the road, and saw flagstones which had been taken up lying on the pavement, but did not see any lighted tarred rope in use.

At this point, the inquiry was further adjourned till next Thursday, when expert evidence will be called.

Report by the Borough Surveyor.

At the meeting of the Bermondsey Borough Council last Tuesday, the Borough Surveyor (Mr. R. J. Angel) presented a long report, dated the 4th inst., as to the gas explosion in Grange Road. He stated that the day after the explosion he made an examination, in conjunction with the officials of the South Metropolitan Gas Company, who later in the day retained the services of Sir Alexander Binnie. In view of the possible consequences of the explosion to the Borough Council, Mr. Francis Fox, of the firm of Sir Douglas Fox and Co., was engaged by the Council to report on the existing state of things and their effect on the roadway. Mr. Angel found that the Gas Company had opened the ground at a spot where a 5-inch "rider" gas-pipe crossed the roadway and joined the gas-mains on the north and south sides of the road for the purposes of equalizing the supply and pressure. When this pipe was uncovered, it was found to be broken across with a new fracture, and one of the broken ends had dropped from its position; there being no earth below to form a support for it. At this point, a hole was discovered under the roadway measuring 13 ft. 6 in. in a westerly direction from the broken gas-pipe and 15 feet across the roadway; the southern end terminating at a brick sewer-ventilating shaft. The hole was 6 feet deep, and commenced immediately under the concrete foundation of the road. The gas-pipe had broken immediately under the tramway track. On the southerly side of the hole there was found a 4-inch low-pressure water-main; and there was also a 9-inch high-pressure main. The cast-iron branch pipe was broken across, just outside the face of the brickwork, and close to the 9-inch main, and water was running from it. The fracture was rusted and appeared to be of old standing. The conclusion he came to was that the 4-inch branch had broken owing to it having been held within the recess of the brickwork. He believed that the 9-inch pipe had slightly sunk. The escaping water had washed away the earth, forming the hole previously mentioned, and had also washed away the support of the gas-main, causing it to break. The brick ventilating-shaft was connected to a deep-level sewer belonging to the London County Council, constructed about 25 years ago by the Metropolitan Board of Works, and the brick shaft about 15 years ago. The water-main and the spur were older than either of these. On the night of the explosion, the Borough Council were repaving the roadway by taking up the setts and relaying them on the existing concrete. The work was poled round, and lanterns were lit and hung on the trestles. The watchman's hut and fire were 30 feet from the side entrance; and the watchman had stated that he did not notice any connection between his fire lights and the explosion. Mr. Angel stated that the conclusions he had come to were that the explosions were caused by the "rider" gas-pipe being broken; this being due to the supporting ground being washed away by the fractured water-main, which was damaged by having been built in the brickwork of the manhole. He was of opinion that the road was not safe, and must be taken up at least from Grange Road to Tower Bridge Road, and re-concreted and paved; and it was useless to do this until the old sewer was either taken out or made safe. The report received from Mr. Francis Fox practically confirmed that of Mr. Angel. The General Purposes Committee reported having communicated with the South Metropolitan Gas Company, the Metropolitan Water Board, and the London County Council, asking them if they are prepared, jointly and severally, to indemnify the Borough Council in respect to the damage caused to the road. The Committee expressed their high appreciation of the prompt and energetic manner in which the Surveyor and his staff acted in the matter.

NEWCASTLE-ON-TYNE AND AUTOMATIC LIGHTING.

Report by the Lamp Inspector.

In the spring of last year, the Public Lamp Inspector of the Newcastle Corporation (Mr. George Lamb) was instructed by the Lighting and Tramways Committee to submit a report showing the lowest cost of lighting the main thoroughfares with self-intensifying gas-lamps consuming 10 cubic feet of gas per hour. For his guidance, it was agreed that certain streets (which were named) should be dealt with; but he was left free to treat the subject either on the present basis or with some form of automatic lighter and extinguisher. The present method of lighting and extinguishing the gas-lamps in the city is by hand. The self-intensifying lamps, being fitted with bye-passes, are lighted by simply operating a gas-cock immediately beneath the lantern; but all other lamps are lighted by means of a torch. Mr. Lamb sends a copy of his report, from which we take the following particulars.

Within the last year or so, he says, there have been introduced largely on the Continent, and to a limited extent in Great Britain, systems of mechanical lighting and extinguishing of gas-lamps by means of sending pressure-waves through the mains. The adoption of any one of these mechanical appliances would result in a saving as compared with hand lighting and extinguishing, as the hand lighting and extinguishing each takes an hour to perform; and consequently the lighting has to be commenced sometimes before the light is actually required, and extinguishing is not completed until after the light has ceased to be needed, whereas by the pressure-lighting system the whole of the lamps can be lighted simultaneously and at the moment they are required. Therefore it is possible to effect a saving of gas. The extent to which the burning hours could be reduced, Mr. Lamb thinks, may safely be taken at an average of half-an-hour per day; and as

by the pressure system it could be arranged to turn out any number of lamps at (say) midnight, a further reduction could be effected. He had the opportunity of observing the experiments made by the Gas Company with samples of seven or eight of the best appliances for operating this system, and, in addition, observed the actual working of one pattern; and he considers that the automatic lighting and extinguishing of gas-lamps by means of pressure waves is perfectly feasible and simple, and bids fair to come into general use.

Mr. Lamb submits the following statement, to show that 443 self-intensifying gas-lamps, consuming 10 cubic feet per hour (3776 hours' lighting), would be required to efficiently light the streets scheduled, together with the possibilities of a saving if the streets under consideration were all lighted by gas-lamps and some mechanical means were adopted to light and extinguish.

Hand Lighting, Present Cost per Lamp, £4 9s. 7*d*.

	Per Lamp. £ s. d.	Per 443 Lamps. £
Operating costs	1 14 9	.. 769
Gas at 2s., less 27½ per cent. discount	2 14 10	.. 1215
	£4 9 7	.. £1984

The Gas Company are prepared to reduce to £4 6s. 5d. the cost per lamp for streets scheduled.

	Per Lamp. £ s. d.	Per 443 Lamps. £
Operating costs	1 11 7	.. 699
Gas at 2s., less 27½ per cent. discount	2 14 10	.. 1215
	£4 6 5	.. £1914

Showing an annual saving over the present cost of 3s. 2d. per lamp, or £70 for the 443 lamps.

Mechanical Lighting (3594 *Hours*), *Cost per Lamp for Streets Scheduled*, £3 10s. 7*d*.

	Per Lamp. £ s. d.	Per 443 Lamps. £
Operating costs	0 18 5	.. 408
Gas as before	2 12 2	.. 1155
	£3 10 7	.. £1563
Annual saving over present cost	£0 19 0	.. £421

Mechanical Lighting (2854 *Hours*), *with Half the Lamps Extinguished at Midnight. Average Cost per Lamp for Streets Scheduled*, £2 19s. 11*d*.

	Per Lamp. £ s. d.	Per 443 Lamps. £
Operating costs	0 18 5	.. 408
Gas as before	2 1 6	.. 919
	£2 19 11	.. £1327
Annual saving over present cost	£1 9 8	.. £657

Mr. Lamb says the first cost of the mechanical appliances for attaching to the lamps, including fixing, is 30s. each, and the total cost for 443 lamps £664 10s. If such a system were adopted, this expense would, of course, have to be borne by the Corporation; but he believes it could be paid at the time of fixing or be spread over a term of years to be agreed upon. In the latter case, interest at 4 per cent. would be payable upon the balance. He adds: "It will be readily understood that, to profitably adopt any system of mechanical lighting, the lamps in the adjacent streets to those set out in the schedule must be brought into consideration, so as to provide groups of lamps (say) from 200 to 250, the number estimated one man can handle. It might therefore be advisable to apply the system to a larger number of lamps than the 443. If such additional lamps were 10 cubic feet self-intensifying lamps, the saving would be at the same rate as set out above; but if No. 3 Kern lamps, the saving would be 7s. per lamp. The present cost of hand lighting is £2 2s. 1d. for 3776$\frac{3}{60}$ hours, and by mechanical lighting it would be £1 15s. 1d. for 3594 hours; and out of such saving the cost of the appliances would need to be paid."

Attached to the report are statements showing for each of the respective streets mentioned for the whole 443 lamps on each of the alternative methods the number of lamps, length of streets, cost per street and per mile, distance between the lamps and the number of lamps per mile, and the total candle power and cost per mile.

EIGHTY CENT GAS FOR NEW YORK.

Under this heading in our issue of the 12th inst., there appeared a paragraph in which it was stated that in the early part of 1906 a Bill was passed by the New York State Legislature, as the outcome of a long inquiry, reducing the price of gas in the city from $1 to 80 c. per 1000 cubic feet. The Consolidated Gas Company resisted the enactment as being unjust and inequitable; and they obtained from the Federal Judge an injunction against the enforcement of the new law, and an order allowing them to charge at the old rate pending an appeal to the Supreme Court. While this was in progress, they had to pay into Court the difference of 20 c. per 1000 cubic feet, which had reached a total of about $9,000,000 (£1,830,000). The Supreme Court decided against the Company, who, however, had leave to appeal if, after trial, they found that the lower rate did not allow of the payment of fair dividends. The judgment had a demoralizing effect on the New York Stock Market, an explanation of which is given in an interesting story of the matter which has been received by the "Financial Times," from their own correspondent in New York. After remarking that the episode was so singular that it deserves some words of comment, he writes, under date of Jan. 8, as follows.

In 1905, a Legislative Commission examined very exhaustively into the cost of producing gas, which at present, through the amalgamation of rival Companies, is an absolute monopoly in New York City. It was as Counsel for this Commission that Governor Hughes, then in private law practice, gained his first celebrity. The Commission reported that gas could be profitably produced and sold for 80 c. per 1000 cubic feet, where $1 was the existing charge; and early in 1906 a law was passed by the State Legislature requiring such reduction. The Company, as was to be expected, at once contested the law, on the ground that gas could not be produced at the price, and that the law was confiscatory. By arrangement with the Court, the Company were permitted, pending their appeal to the Upper Courts, to continue charging for gas at the $1 rate, but were required to place in the hands of a designated Trustee the 20 per cent. difference between the old price and the price stipulated by the new law. This trust fund was to revert to the Company in case the Courts eventually decided against the law, or was to be distributed to the consumers in case the law was upheld; and at the close of last year the fund amounted to no less than $9,000,000. The Lower Courts had ruled in favour of the Consolidated Gas Company; and on the basis of these rulings, combined with the disposition of the Stock Exchange during the last half of 1908 to assume in advance any sort of favourable development which might be rumoured, a huge speculation in Consolidated gas stock sprang up. Prior to the new law, the Company had been paying 8 per cent. annual dividends on a considerably inflated stock. When the law was passed, the Company prudently cut their dividends to 4 per cent. This did not warrant any extraordinarily high price for the stock; and when, in the middle of 1908, it had risen from 74 (the panic price) to 123, it was generally considered it was selling rather high.

This was not, however, the view of speculative Wall Street. Taking it for granted that the Supreme Court would decide in favour of the Company, that the 8 per cent. dividend rate would be resumed, and that the $9,000,000 trust fund would be distributed to shareholders in the shape of an extra dividend, a furious speculation in the shares started up, which carried them to no less a figure than 167¼ in the last weeks of 1908. The process of advancing the price was marked by all the excesses of the Stock Exchange practice. The Supreme Court hands down its decisions on Monday mornings. The speculation for the rise in gas stock, with the usual professional apparatus, would regularly be begun on Friday and Saturday, with the distribution of tips in every direction, to the effect that the decision of the Supreme Court had leaked out, and that important houses had learned that it was to be in favour of the Company. In the mood of Wall Street since the election, its response was inevitable. It would be surprising if one could tell in detail just what sorts of people it was who held great blocks of Consolidated gas stock on margin. It was a fashionable favourite at the clubs and with women. Some men whose judgment is ordinarily good were actually holding the stock in confident expectation that it would reach 200.

On Monday, Jan. 4, the Supreme Court of the United States handed down a decision which, by unanimous decree of the Court, decided against the Company, making it inevitable not only that the 80 cent rate should stand until absolutely conclusive evidence was produced that it was unprofitable, but that the $9,000,000 trust fund would have to be immediately distributed to the consumers who had paid the higher rate since 1906. The result was what might be imagined. Most of the people who held Consolidated gas stock on a margin threw it over with absolute recklessness. Within two days, the stock had broken 42 points. This was not all. On the one hand, the destruction of margins through this extraordinary decline had crippled numerous speculators who were dabbling in other stocks, thus forcing them to throw the latter on the market; and, on the other hand, the moral effect of such shattering of illusions was extremely damaging. The best judges believe that if the Consolidated gas decision had not been given out at all, something else would certainly have arisen as an excuse for the general break in prices.

Referring to the above matter in the last issue, the "American Gaslight Journal" said: "The contention between the Consolidated Gas Company and the people, as to whether or not the measure known as the '80-cent Gas Bill' was operative, from the time named therein and thereafter, constitutionally, has been decided by the highest legal tribunal in the land in favour of its legality. A syllabus of the Bill, consisting of twelve summaries, has been made public; but that is sufficient to show that the verdict is with the people, and accordingly against the Company. Under the circumstances, it may be the part of prudence to refrain from lengthy comment on the decision until the same is obtainable in its entirety. However, these things may be stated now, 'without prejudice' as to what may be said anent the matter later on. The syllabus or memorandum sent down by Judge Peckham shows that the entire Court concurred in the findings; that the 80-cent law is not confiscatory—at least, so far as known at present; that goodwill does not go with the business of a corporation which has dealings directly with the people, in so far as goodwill may be considered a money asset; that 6 per cent. is a sufficient return per annum on any extra-hazardous business that directly concerns the people; that the Company should have tried, for a time not definitely stated, how near to pauperization a compliance with the Act could bring it before it started suit to determine whether it was approaching the almshouse under legal duress; that a possible increase in the business done at the 80-cent rate would more than compensate for the relatively higher rate obtained on less business at such rate, &c. *Contra*, we have admissions that the consolidation as originally planned was legally done; that the pressure slush of the 80-cent measure is unconstitutional (to be sure, all will be pleased to know that impossibilities are not recognizable by our highest Court, even though a Governor of the State of New York decided otherwise when he signed the Bill); and that if the rate is eventually found not to yield 6 per cent. per annum, the case may be again brought up, always 'without prejudice.'"

Standing Order Proofs in Connection with Private Bills.—The Examiners had before them last week the memorials complaining of non-compliance with Standing Orders in the cases of the petitions for the Ammanford Gas Bill and West Gloucestershire Water Bill; and they found that the allegations had not been sustained. No memorials have been deposited in respect of the remaining Bills in the list.

THE KITSON-EMPIRE LIGHTING COMPANY.

Removal of Works from Willesden to Stamford.

The Kitson-Empire Lighting Company, Limited, whose system of incandescent oil lighting is now to be seen in operation in nearly all parts of the civilized world, are about to remove their works from Willesden Junction to Stamford; and this fact lent more than usual interest to the annual staff dinner which took place last Friday at the Café Monico, Piccadilly Circus, when a party of some sixty sat down, thirty or forty of whom were members of the staff. Between the speeches an excellent musical programme was enjoyed.

The chair was taken by Mr. Arthur Kitson, the inventor of the lamp, who, in response to the toast of the "Kitson-Empire Lighting Company" (which was proposed by Mr. Ingle), gave many interesting particulars with regard to the business. He said that oil lighting was an old invention; and people sometimes asked why it should to-day be talked of, in the time of the inventions of gas and electricity. The fact remained, however, that the oil industry to-day was the greatest lighting industry in the world. He was told that there were something like 8,000,000 or 9,000,000 oil-lamps lighted each evening in Great Britain, with all the gas and electricity there was; and if they went to the eastern countries, of course, oil was even more largely in evidence. The business of their Company had grown against tremendous odds. They had had no such help as the gas or electricity undertakings would give to a new gas or electric lamp. No oil company in the world, so far as he knew, had given them the slightest assistance. They had had to fight the other lighting interests; and, in addition to this, they had had the insurance companies against them. These bodies made it a rule to object on principle to any new system of illumination that appeared. However, they now permitted the lamps to be placed in all ordinary places. A great deal had been said about the new Patent Act; but this would cut both ways. In all countries abroad they were now forcing foreign inventors to open factories and work on a practical scale; so that while the Act had done a certain amount of good in this country, it had worked hardly on the inventor, who, if he had to open factories in every country in the world, would need to be a very large capitalist. Their Company had between 400 and 500 patents; and he believed there were at the present time considerably over a million of the lamps in use over the globe. The future was exceedingly bright; and he was firmly of opinion that the next few years would see a wonderful development of the system. They had certain inventions now in the laboratory which would probably startle a great many of their rivals. These were new types of lamps which he thought would be very successful.

The Secretary (Mr. F. P. Daniels) proposed "The Directors," and expressed his regret that the Chairman of the Company was unable through indisposition to be present. He coupled with the toast the name of Mr. Scott Lings, a Director, who replied. Mr. Kitson next submitted "The Staff," and referred to the removal of the works to Stamford. There were, he said, two reasons for this—one was to save expense, and the other was to make the work more attractive for their employees by building up a sort of Garden City. The first idea was to go to Letchworth; but they found there were certain disadvantages in going there, and certain advantages in going to Stamford. The Manager (Mr. Graham Chubb) replied to the toast; and thereafter Mr. St. George Fox-Pitt (a Director) proposed "The Visitors," which was responded to by Mr. John Nettlefold and Mr. Leon Gaster. Mr. Nettlefold in the course of his remarks said he hoped one day to have co-partnership in the business. He did not, however, think that they had as yet reached the stage when they could ask the employees to share the losses as well as the profits—and without this it was impossible to have true co-partnership.

ELECTRICITY SUPPLY LOSSES AT REIGATE.

Mr. H. R. Hooper, one of the Inspectors of the Local Government Board, elicited some unpleasant confessions from the Town Clerk of Reigate (Mr. A. Smith) in the course of an inquiry held in that town last Tuesday in regard to an application made by the Corporation for sanction to the borrowing of £4000 for electric lighting purposes. The total amount already sanctioned for electric lighting is £45,830, and, according to the figures furnished to the Inspector, £2841 has been overspent. There was an overdraft of £1654, and Mr. Hooper inquired as to how the money had been laid out. Particulars having been given, he said that out of the sum of £4000 applied for £1600 was for over-expenditure, which left a balance of £2400. He remarked that the Local Government Board had sanctioned loans for certain things, and the present application was to cover excess expenditure. He considered this was very undesirable, and it seemed as if it had been going on practically from the beginning. The Town Clerk explained that the borough covered a large area which was in the main residential, and a considerable amount of capital had to be employed, while there were a great many unproductive mains. An official from the Town Clerk's office said the undertaking was started in May, 1901, and up to the end of the year the loss was £1184. The Inspector said that up to December, 1902, they lost £1877; up to 1903, £4480; up to 1904, £1505; in the 15 months to March 31, 1906, £506; to March 31, 1907, £957; and to March 1, 1908, £1043. It was explained by the official referred to that the net loss for 1908 was £1159; while the estimated net loss up to March this year would be £3000. The Inspector inquired of the Electrical Engineer (Mr. W. S. Ross) how the return of receipts for the half year ending Sept. 30, 1908, compared with the corresponding period of 1907; and he said the undertaking was doing better. Asked for particulars as to the first nine months of the year, he replied that he had not the figures. Mr. Hooper commented on the fact that the works had been going on for nearly eight years, and there was a sum of £11,000 of accumulated debts. It surely demanded the most serious consideration of the figures before incurring further expense. What were their prospects? The Engineer said they were doing better. Mr. Hooper replied that they had no figures; and he added that this was a very sorry thing. A sum of £11,000 had been spent without any relief to the rates. Surely they went into the figures each week, and could tell the percentage of revenue from each street. The Engineer said he had not these figures. The Inspector remarked that this was not satisfactory. He wanted the profits and losses on each street so as to be able to be guided. Surely they did not propose to go on in this fashion. The £4000 which was wanted was going to cost about £300 a year. What were the prospects which induced them to apply for the money? He offered to adjourn the inquiry for a short time, in order that the position might be considered. It was his wish to clear up everything to the 1st of April, so that there might be a new start. Later, he pointed out that there was not a depreciation fund. He desired to get at the allocation of the £4000. He asked that particulars concerning mains, capital expenditure on each street, number of consumers, percentages of revenue for each street, &c., should be sent to him. The inquiry then closed; the Town Clerk thanking the Inspector for the manner in which he had conducted the inquiry, and promising that they would do their best to satisfy his requirements.

COST OF GAS AND ELECTRIC LIGHT IN BOSTON (U.S.A.).

The Boston Consolidated Gas Company are carrying on a vigorous campaign against the electric light; and among other literature they have put in circulation is a handbill showing in a very striking way the comparative amount of light obtained for $1 from a new inverted incandescent gas-lamp and a tungsten electric lamp respectively. The light from the former source is represented by a black band 6¼ inches long; that from the tungsten lamp by one of the same width, but only 1⅛ inches long. The comparison is based upon actual tests, made by the electrical authorities themselves. The gas test was made in the electrical testing laboratories of New York; and the electrical data are those published by the General Electric Company. The conclusion, therefore, is entirely free from any prejudice in favour of gas. The gas-lamp was found to burn 3·22 cubic feet per hour; the tungsten lamp (large size), 100 watts per hour. Even with this large electric lamp, the gas-lamp was shown to give 3 per cent. more light in the directions desired, using the same kind of reflector. The following table shows the relative cost of the two lamps:—

	Gas.		Electricity.
Consumption per hour	3·22 feet	..	100 watts
Cost per hour, taking gas at 80 c. and electricity at 10 c., rather than 12 c. as advertised	0·25 cent	..	1 cent
Cost for ten lamps, burning five hours a day for four months	$12·50	..	$50·00
Cost for renewals and maintenance	4 00	..	11·00
Total cost	$16·50	..	$61·60

The Company point out that, besides the saving in expense, the new inverted gas-lamp gives a much better light than any electric lamp ever made. A firm of gun makers in the city, who, among others, have recently discontinued their tungsten electric lamps and installed the new inverted gas-lamps, made an actual comparison of the quality of the light in their store; and they testify as follows: "The practical lighting of these lights, especially on show cases, is very marked and attractive. Quality and diffusion are very soft, having much the same colour as daylight."

Exmouth Water Bill.

A poll of the ratepayers of Exmouth, on Thursday last, resulted in the rejection of the Water Bill by the narrow majority of 3 votes. The actual numbers were: For the proposed Bill, 669; against, 672. This creates a situation of some difficulty for the District Council, who will hold a special meeting this week to decide upon their future course of action. It is understood that about £4000 has already been spent in the trial boring at Newton Poppleford; and though this has not yet resulted in the discovery of the anticipated abundant supply of water, the Engineers, Messrs. G. Hill and Sons, are confident of its success. The adverse vote of the ratepayers is ascribed to the fears of those in the rural ward of a large increase in the rates. There is also a considerable party in the town who have no confidence in the present scheme, and are afraid it will be unduly costly. According to one view, the Council have courted defeat by too great secrecy in their proceedings. They are blamed for the action which they took two years ago to supplement the supply by annexing the water of Yettington Brook, which involved them in litigation. It is also said that unreasonable delay took place in beginning the present boring, with the result that the proceedings for the promotion of the Bill had to be taken before the result of the trial was known. The effect of this was no doubt seen in the large number of abstentions from the poll—only about half the ratepayers having recorded their votes. At the least, a parliamentary session has been lost; but it is anticipated that the Council will continue the boring operations, and that in the meantime some steps will be taken to secure a temporary supply for next summer. At present the water is cut off at night.

Slough District Council and the Water-Works Purchase.—A largely attended meeting of ratepayers was held recently in the Public Hall, Slough, to decide, among other things, whether the Council should proceed with the second application to Parliament for power to acquire the undertaking of the Slough Water Company, in accordance with the provisions of the Bill of which notice was given in November. A resolution approving of the project was submitted; but it was supported by only two ratepayers, while a perfect forest of hands was held up against it. It was therefore declared lost—an announcement which was enthusiastically received.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The visit of the Western Juniors to the Dawsholm Gas-Works this afternoon was favoured with excellent weather, which made it a pleasure to be moving about. This advantageous state of affairs, together with the fame of the works, brought out a larger number than usually attend visits. Probably the works were not new to many of the members, because the gate is freely opened to all who wish to see them. To those who had been there before, there was not much to be seen that was new—probably the only new thing being the arrangements for hauling coal-waggons forward by hydraulic capstans, and tipping them by the same power. These received a large amount of attention. A visitor cannot fail to be impressed at Dawsholm with the wonderful tidiness of the place, considering the amount of work and the quantities of materials handled, and also with the order and regularity of all the working. This must be attributed to careful planning at first, and to good discipline in the present. That the idea of careful planning is well founded is borne out by the fact that it has not been found necessary or desirable to change any of the plant laid down by the late Mr. William Foulis. It has all worked so satisfactorily that there has been no need to change it, which is a further tribute to the genius of Mr. Foulis; and is also a tribute to Mr. Wilson, his successor, in his merely holding on to what he has found to serve him efficiently.

In Dundee, at the beginning of the financial year, on the advice of the Gas Engineer and Manager—Mr. A. Yuill—the Town Council refrained from contracting for coal for the twelve months, and only bought enough to supply them for eight months. They have been in the market seeking supplies for the remaining four months, and on Tuesday tenders for 15,000 tons were accepted. The average price is 10s. 7d. per ton, as against 12s. 5d. under the contracts entered into for the first eight months of the year. At the meeting of the Gas Committee, Mr. J. Reid, the Convener, stated that, by the breaking up of the contract in the way they had done, a saving of £1000 had been effected to the Corporation. Last summer there were complaints of vile smells from reclaimed land on the foreshore at the west end of the city. To assist in their abatement, the Town Council ordered that spent lime from the Corporation gas-works should not be deposited there any longer, and arrangements were made for having the lime taken to sea in hopper barges. This method of disposing of it is found to have increased the cost of the work from 11d. to 2s. per ton—equal to a sum of £150 a year. At the meeting of the Gas Committee, Mr. Burke said it was not at all certain that spent lime was the cause of the smells. He was of opinion that the whole question of the deposit of lime should be further considered. Mr. Yuill was asked to report on the matter.

At a meeting of the Edinburgh Parish Council on Monday, Mr. M'Gibbon called attention to the payment of £87 11s. to the Edinburgh and Leith Gas Commissioners for the month from Nov. 15 to Dec. 15 for gas consumed in the poorhouse. They might be able to provide gas for themselves at a much less cost. A Committee might be appointed to look into the matter. The Chairman said he hoped no Committee would ever suggest that they should put down gas plant. The amount spent for gas during three months in the year preceding last was £238; while during the corresponding months of last year it was only £198. The subject was not pursued further.

In the Edinburgh Town Council on Tuesday, Mr. Bruce Lindsay, a recently-elected member of the Council, put a question with reference to the price of gas supplied through prepayment meters. The charge, he said, was 4s. 2d. per 1000 cubic feet, as compared with 3s. to ordinary consumers; and he thought the difference in price was much in excess of the extra cost of delivery. It was explained that Mr. Herring, the Gas Engineer, had been communicated with, and that he had written in reply that the cost of instalment per prepayment meter consumer, as well as the cost of maintenance and supervision, was very much greater than in the case of ordinary meter consumers.

In the "Dunfermline Press" of to-day, there is the following statement: "The principal topic in Crossgates during the week has been the proposed introduction of a gas supply into the village for public and private lighting. Some time ago, Mr. Dick, a merchant, communicated with the Cowdenbeath Gas Company, with a view to having his premises lighted up with a gas supply from that source. The Directors of the Gas Company, however, were doubtful about incurring the expense involved, especially as there was little chance of any more customers being obtained in the village. . . . It was thought that the question of expense might be solved, if it could be arranged to have a pipe laid to Crossgates and Mossgreen, as a good source of revenue could be obtained from these places, with the lighting of the streets and private houses. Accordingly, the Manager and a Director visited the village, and canvassed the parish councillors and others with a view to ascertaining their opinion on the matter. It is understood that the Cowdenbeath Gas Company have applied to the County Council for permission to lay pipes; but since then a new development has occurred, owing to the fact that Dunfermline are in the field, and may possibly be able to grant the villagers more advantageous terms in the matter of a lighting supply. Councillor Stewart and Mr. Waddell, the Manager of the Dunfermline works, went over the proposed route in the village on Wednesday, and had a talk with a few of those interested in the project. Our Crossgates correspondent writes that Dunfermline would seem to have a considerable advantage over Cowdenbeath, in regard to the price of gas. The former supply it to their customers in the burgh at a rate of 2s. 6d. per 1000 cubic feet, while the Cowdenbeath charge is 4s. 2d. On the face of it, there seems to be no doubt as to which would be the favoured Company. . . . However, it seems that, in the even of a supply being obtained from Dunfermline, the cost of the laying of the track would have to be borne (wholly or partly) by the probable consumers; and this would, of course, involve an addition to the price per 1000 cubic feet. But, even allowing for this, there would probably be a margin in favour of the Dunfermline Corporation. It is understood that, pending further inquiry into the matter, Mr. Wallace, the County Council representative, has been communicated with and asked to urge the Dunfermline District Committee to refuse the application of the Cowdenbeath Company for wayleave. A public meeting will be held shortly to consider the matter."

To the first statutory meeting of the East Wemyss and Buckhaven Gaslight Company since its conversion into a limited liability company, the Directors reported that no cash had passed in respect of the transfer of the assets of the old Company, as the shareholders had received fully paid-up shares, 3750 in number, for their interests in the old concern.

In Edinburgh, on the afternoon of Saturday last, there was a strange experience, in the shape of a fire which broke out in an electric conduit. Smoke and flames began to issue from a cellar beneath the premises of a drapery firm in South Bridge. The shop was closed for the day, and the firemen had difficulty at first in getting at the seat of the fire. The street was filled with a pervading odour of burning rubber. Electric lamps in use in the district went out; and thick smoke began to issue from cracks in the pavement, and from the pillars of the street electric lamps. It seemed as if the fire was in the electric conduit, and that the origin of it had been the fusing of the wires carrying the current. The fire, so far as it had spread to the shop cellar, was easily overcome. But there was considerable difficulty in dealing with the fire under the pavement. Flames began to shoot up from the manholes; four of them for a time spouting fire to a height of 3 feet. One cover was blown off. The firemen were obliged to break up the paving-stones to get at the fire. The electric current was cut off, and after struggling for three hours with the mysterious outbreak, the flames were subdued.

In Aberdeen, at half-past one o'clock last Monday morning, an explosion occurred in the electric light conduit on the east side of Market Street, by which four manhole covers were displaced, and the pavement was disturbed for a distance of about 45 yards. At that hour there was nobody about except a policeman, who was, however, fortunately not in the immediate vicinity of the occurrence.

As the result of the exceedingly rapid thaw which took place at the beginning of this week, there were heavy floods in various parts of Scotland. In Perth the River Tay rose to such a height that the water entered the houses nearest to the river; and the inhabitants were obliged to leave their homes. On Tuesday evening it was found that the electric lamps would not light. From dusk till nearly ten o'clock the streets were in almost total darkness, and then the arc lamps were lighted. In domestic and business premises the light did not return for some hours. Great inconvenience was felt all the evening; candles having to be resorted to—in one establishment as many as 800 being in use. Needless to say, gas lighting was unaffected.

The Sanquhar Town Council last week considered a report upon the condition of the gas-works by Mr. J. O'Neill, the Gas Manager at Old Cumnock. Mr. O'Neill considered that the present means of carbonizing did not, and could not, give satisfactory results. In his opinion, they should adopt a scheme of reconstruction according to a plan which he enclosed, the cost of which he estimated at £620. If they spread the expenditure over forty years, at the rate of 4 per cent., the annual expenditure would be £39. If they sold 1000 cubic feet more gas per ton of coal, they would realize £68 10s.; and deducting the £39, there would be an annual saving of £29 10s. He also reported that the gasholder showed a pressure of 7 inches, which threw unnecessary labour on the engine; and he suggested counterbalancing weights for it. Bailie Love, who presided, said that the retorts, after having been in use for only fourteen months, were completely done, and the best thing to do, he thought, would be to build a new retort-house, and to put in a new set of retorts. In the discussion which followed, it was mentioned that £2500 had been spent upon the gas-works in recent times. It was resolved to get a report upon the situation from an expert.

COAL TRADE REPORTS.

Northern Coal Trade.

There has been more activity in the coal trade of Durham and Northumberland during the last few days; and the work at the collieries has been generally brisk. In the steam coal trade, shipments have been heavy for this season of the year, and prices have shown some firmness. Best Northumbrian steams are from about 10s. 3d. to 10s. 6d. per ton f.o.b. for prompt shipment, second-class steams from 9s. 3d. to 9s. 9d., and steam smalls are weak at from about 4s. to 5s. 9d. In the gas coal trade, the demand is still strong, though it shows signs that there is a lessened consumption now; but the deliveries are still heavy on the long contracts. Durham gas coals vary in price from about 9s. to 10s. per ton f.o.b. for the usual qualities, and from 10s. 6d. to 10s. 9d. for the "Wear specials." There have been some sales for forward delivery, at prices that are not very much different from those above quoted. One or two small yearly contracts are also in the market; but the quantities are small compared with those that have been settled previously. One or two Danish and Swedish towns will shortly ask for tenders for rather fuller supplies. In coke, the market is steady; but gas coke is plentiful, and is somewhat dull at about 12s. 6d. to 13s. per ton f.o.b.

Scotch Coal Trade.

The market is not improving so far as sellers are concerned. Splint is the only coal in demand. The prices quoted are: Ell 10s. 3d. to 11s., splint 10s. 6d. to 10s. 9d., and steam 10s. to 10s. 3d. per ton f.o.b. Glasgow. The shipments for the week amounted to 198,077 tons—an increase of 64,690 tons upon the previous week, but a decrease of 17,149 tons upon the corresponding week of last year. For the year to date, the total shipments have been 409,099 tons—a decrease of 25,021 tons upon the corresponding period.

Poll on the Gas Clauses in the Salford Bill.—The Mayor of Salford (Alderman Stephens) has received a requisition from a number of ratepayers demanding a poll on certain clauses in the Bill of the Corporation, one being the proposed reduction of the illuminating power of the gas from 17 to 14 candles. The cost of taking a poll in the borough is estimated at nearly £700.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Jan.* 23.

Sulphate of Ammonia.

The market opened quietly, and as the week progressed supplies have become more plentiful and demand less in evidence. So that prices have gradually declined; and at the close orders are scarce, with quotations down to £11 11s. 3d. per ton f.o.b. Hull, £11 12s. 6d. per ton f.o.b. Liverpool, and Leith to £11 15s. per ton f.o.b. There has been very little interest from abroad in the forward position, prices required by makers being regarded as prohibitive. There has been some buying for home consumption at a moderate premium on spot prices.

Nitrate of Soda.

This market has also been very quiet; the season being still young, and buyers being in no hurry. Spot prices, therefore, remain 9s. 6d. and 9s. 7½d. per cwt. for ordinary and refined qualities respectively.

LONDON, *Jan.* 25.

Tar Products.

The markets for tar products have been practically without change during the past week. The market for pitch is in about the same position, and there are still sellers on the Continent for January-June delivery at equal to 18s. to 18s. 6d. f.o.b. England. A considerable quantity of business has been done on the east coast at 18s. 3d. for January-June delivery. On the west coast nothing of importance has been reported, though sales in Swansea for water-borne pitch have been made at reasonable figures. Creosote remains firm, and prices are unchanged. Benzol 90 per cent. is very quiet indeed, and business is only transacted with difficulty at low figures. Fifty-ninety per cent. benzol continues quiet; and this is also the case with toluol. Solvent naphtha is steady; but there is not very much inquiry for this article. Heavy naphtha is quiet; and the majority of consumers appear to be well covered for this year's supplies. Carbolic is very weak. On the east coast, business has been done in 60's at 1s.; while in the Manchester district business is reported to have been done at 10½d. to 11d. Naphthalene is quiet; while salts are unchanged.

The average values during the week were: Tar, 10s. 9d. to 14s. 9d., *ex* works. Pitch, London, 18s. 3d. to 18s. 6d.; east coast, 18s. to 18s. 3d.; west coast, 17s. to 18s. f.a.s. Mersey, 17s. 3d. to 17s. 9d. other ports. Benzol, 90 per cent., casks included, London, 6d. to 6¼d.; North, 5½d. to 5⅝d.; 50-90 per cent., casks included, London, 7d. to 7¼d.; North, 6½d. to 7d. Toluol, casks included, London, 9d. to 9¼d.; North, 8¼d. to 9d. Crude naphtha, in bulk, London, 3⅜d. to 4d.; North, 3½d. to 3⅝d.; solvent naphtha, casks included, London, 11d. to 11½d.; North, 10d. to 10½d.; heavy naphtha, casks included, London, 11d. to 11½d.; North, 10d. to 10½d. Creosote, in bulk, London, 2⅜d. to 2⅝d.; North, 2⅜d. to 2⅝d. Heavy oils, in bulk, 3d. to 3 1/16d. Carbolic acid, 60 per cent., casks included, east coast, 1s.; west coast, 11d. Naphthalene, £3 10s. to £6 10s.; salts, 32s. 6d. to 35s., packages included and f.o.b. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article has been steady throughout the past week, but there has not been quite so much demand. Probably dealers have covered-in their present requirements, and are anxious to see a fair amount of inquiry from abroad before committing themselves for forward delivery at the advanced present prices requisitioned by makers. The principal Gas Companies still maintain their prices of £11 15s. to £11 17s. 6d.; but outside makes can be secured upon Beckton terms at £11 10s. to £11 12s. 6d. In Hull, business has been done at £11 12s. 6d. to £11 13s. 9d.; but for the best makes, £11 15s. for February-March has been declined. In Liverpool, £11 13s. 9d. has been paid. In Leith, offers of £11 15s. have been declined; but buyers refuse to pay £11 17s. 6d.

The Lighting of Penge.

Last Tuesday, traders and residents of Penge held a meeting to consider the advisability of the better lighting of the trading centres of the district. The chair was taken by Mr. Bryce Grant, who said he had endeavoured to find out what had taken place in other neighbourhoods. At Beckenham they had arc lights of 2000-candle power, and these cost about £20 a lamp; but the flame arc lamp was lighted at a cost of 15 guineas. They turned off the current at midnight, and had lamps with a smaller illumination. Croydon's electric lighting was much about the same; the flame arc lamps costing 14 guineas per annum. The Company were offering excellent terms for Penge—viz., 1½d. per unit.—but it would not cost Penge any less than it had cost Croydon and Beckenham; and if they went from gas to electricity they would have to make out a good case. He felt it a great pleasure to do anything he could to assist his fellow traders; but he was not pledged to either electric lighting or gas, and he would only support a proposal after mature consideration. He would not recommend any particular kind of lighting; but he might in passing say that he had heard the Beckenham Council were not satisfied with their electric lighting, and were proposing to adopt an improved system of gas lighting. They found that some authorities went from gas to electricity; while others went from electricity to gas. It was, however, still very much a question as to which system of lighting was the best and most economical. He thought a brilliant electric light could not be beaten; but there was the question of expense. In answer to a question, he said that for gas the charge would be about £2 10s., and £3 1s. 6d. each for big lamps. Ultimately the following resolution was adopted by a large majority, and a committee was duly appointed—"This meeting of ratepayers and property owners is of opinion that it is very desirable that the lighting of the business streets under the control of the Penge Urban District Council should be improved by adopting the electric light or other greatly improved light." Mr. Payne remarked that he did not want the meeting to run away with the idea that the Council had never considered an improved lighting scheme; but they found that electricity would cost the district another £1000, and they therefore could not adopt it. He hoped they would get improved lighting; but they must not grumble when they obtained it and were asked to pay for it.

A Record Water-Tank.

It was stated in the "Leeds Mercury" last Thursday that, subject to formal Government sanction, Messrs. Clayton, Son, and Co., Limited, had secured the contract for a huge steel tank for the supply of water for domestic and other purposes to the city of Calcutta. The tank will hold 9 million gallons, and will involve the use of over 7000 tons of steelwork. The reservoir itself will be 321 feet square and 16 feet deep, and it will be divided by cross-frames into four equal sections. One of the main engineering problems in connection with the erection of this tank is that, in order to secure sufficient gravitational fall to supply the city, it is necessary that the bottom of the reservoir should be at a height of over 90 feet above the ground-level. For this purpose, it will be supported on 81 steel trestles. There was a great international contest for the contract, but the tenders show very wide variation—that of Messrs. Clayton (£91,367) being something less than half the offer of the German firm who headed the list. Our contemporary says: "Interest in the contract has been accentuated by the fact that several Indian firms were among those who sent in tenders; and a strenuous effort was made in a section of the Indian Press to secure the contract for one of the local firms, whose tender was only £91,666, or £300 more than the Leeds firm. Probably the fact that Messrs. Clayton recently erected a large gasholder in Calcutta for the Oriental Gas Company had something to do with their securing the order."

Huddersfield Corporation and the Livesey Memorial.

A resolution of the Huddersfield Gas Committee to contribute £10 to the Livesey Memorial Fund was protested against by a Labour member when the Committee's minutes were before the Council. This gentleman—a Mr. Pickles—stated that he "objected to Sir George Livesey being glorified because of his capacity for fooling the workers. Sir George ruined a certain Trade Union, and robbed his workmen of certain facilities." This attack, however, did not receive much support; and Alderman Balmforth dealt with it in very conclusive terms. He remarked that it was quite different testimony from that offered by Mr. Pickles which was forthcoming at the funeral of Sir George Livesey two or three months ago; thousands of his own workpeople being present. There was a dispute at the South Metropolitan Gas-Works nineteen years ago; but since then there had been no dissatisfaction whatever. Some 5000 men were employed at the works; and owing to a scheme of profit-sharing initiated by Sir George, no less a sum than £360,000 stood in the books of the Company to the credit of the employees. This averaged some £70 per man; and he (Alderman Balmforth) maintained that they were this much better off than they would have been if the profit-sharing scheme had not been introduced. The conduct of Sir George Livesey was more praiseworthy than that of attempting to sow seeds of hatred between employer and employed.

Gas for Destructor Lighting at Acton.

At the meeting of the Acton Urban District Council on Thursday, the members had under consideration a further report from the Electrical Engineer with regard to the proposed lighting of the dust destructor by electricity. He stated that to obtain 2620-candle power for 3800 lighting hours per annum the cost, with gas at 2s. 9d. per 1000 cubic feet, would be £152 0s. 11d., and £133 12s. 4d. with gas at 2s. 5d.; while the cost of electric light for 2620-candle power for 3800 lighting hours per annum would be £104 8s. 8d. The Electricity Department proposed to give only 1795-candle power, which would be "actual," and this he considered quite sufficient. The cost of electric light for 1796-candle power for 3800 hours per annum would be £71 11s. 6d., and for 2500 hours £29 12s. 6d. The cost of gas lighting for the former, with gas at 2s. 9d. per 1000 cubic feet, would be £68 15s., without any allowance for the consumption in the bye-passes when the lamps were not alight. He declared that, taking candle power into consideration, electricity would be the cheaper method of lighting the destructor. It was mentioned at the conclusion of the report that the cost of installing electricity would be £109, including a transformer, in order that alternating current might be used; and that the cost of the installation of gas would probably be £47. A motion to light the destructor by electricity was discussed at some length; but on being put, it was defeated by 7 votes to 4, and gas was decided upon.

Cookery Lectures and Demonstrations at Sutton.—The Sutton (Surrey) Gas Company have lately opened new show-rooms in the High Street, and have furnished them with an excellent collection of appliances for the use of gas for lighting, heating, and culinary purposes, which have been appreciatively noticed in the local paper. In connection therewith, they have arranged for a series of afternoon cookery lectures and demonstrations by Mrs. A. M. Collins. These commenced last Tuesday and were continued till Friday; they will be resumed to-day and close on the 29th inst. They cannot fail to be productive of good.

Loan for Water Supply Refused.—The Local Government Board have refused to sanction the application of the West Penwith (Cornwall) Rural District Council for a loan of £3200 for a water supply for Carbis Bay, on the ground that the proposed source of supply on Treva Moor is liable to pollution. It was pointed out by the Board that in April, 1904, they were informed by the Council that the Vorwas mine on Treva Moor had been closed for many years and was never likely to be reopened. At an inquiry in April, 1908, it transpired that the mine was opened within a few weeks of that assurance in 1904 and being found unproductive was closed again. In a letter from the Clerk to the Council in June, 1908, it was stated that the mine had not ceased working, and that arrangements were in contemplation by which it might be worked on a large scale. The Clerk now stated that he believed the mine was now turned into a storehouse for machinery. Operations in the mine had been suspended; but it was expected that it would be again worked.

Gas and Electricity at Llandudno.

The Llandudno Urban District Council have had before them a report by their Gas Manager (Mr. Walter Shadbolt) upon a proposal to illuminate the promenade with incandescent gas instead of with electric arc lamps, as at present. He submitted figures showing that the present arc lamps gave a light of 8100-candle power, at a cost of £163 16s. per annum; while flame arc lamps would give 49,410-candle power at a cost of £112 16s. 9d. per annum. Welsbach self-intensifying gas-lamps would give 16,200-candle power for £67 10s.; and high-pressure gas-lamps would give 40,500-candle power for £84 7s. 6d. per annum. The high-pressure lighting would involve pressure plant and special mains; but he should expect the reduced consumption to justify the outlay. Mr. Shadbolt added statistics showing that incandescent gas-burners have a greater diffusive power than electric arc or flame arc lights, in proportion to candle power. On the recommendation of the Gas Committee, the Council decided, as an experiment, to instal eight pairs of self-intensified gas-lamps, to be fixed in place of one of the series of eight electric arc lamps, and that on the adjoining series of eight lamp-columns new electric arc lamps of modern construction be placed, so that the two systems may be compared.

Coventry Gas Undertaking.

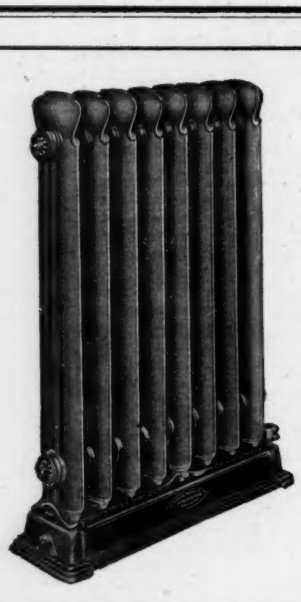
Some interesting facts showing the development of the Coventry Corporation gas undertaking are contained in an official statement prepared by the Town Clerk and issued to the members of the Council in the form of a municipal handbook. The works were purchased in 1884; the consideration for the sale by the Company being the issue to the shareholders of gas certificates, payable on June 30, 1899, amounting to £148,800, and the taking over by the Corporation of the bond debt of the Company amounting to £20,000—making a total of £168,800. Under the provisions of the Coventry Corporation (Gas Purchase) Act, 1884, the Corporation are authorized to borrow the sum of £218,800 for the purpose of providing the above sums, and for extensions and other purposes of the gas undertaking. The Corporation subsequently obtained power to borrow money and take lands for the construction of new gas-works at Foleshill. These works are now practically completed; and the manufacture of gas will shortly be in full operation—a small quantity, relatively speaking, having been produced there for some time past. The growth of the gas undertaking as a whole in Coventry is indicated by the fact that, whereas in 1899 the quantity of gas produced was 504,602,000 cubic feet and the receipts were £67,855, in 1908 there was produced 827,628,000 cubic feet and the receipts reached £131,530. In the ten years thus covered, there has been earned in net profits £43,120, of which £19,000 has been paid over to the General District Fund in relief of the rates, £6000 transferred to the reserve fund, and £16,000 written off capital. The price of gas in Coventry ranges from 1s. 9d. to 2s. 5d. per 1000 cubic feet, according to the quantity consumed.

Dover Gas-Works Reading and Recreation Room.

Reference has been made in the "JOURNAL" on many occasions to the reading and recreation room at the Dover Gas-Works, and to the excellent results, in bringing into closer relationship the Directors, officials, and workmen of the Company, which have ensued from its foundation. The object of the fund by which the room is supported is to provide instructive recreation and amusement for the members, all of whom are employed upon the works. The management of the fund is in the hands of a Committee, of which Mr. Ralph Herring, the Company's Engineer, is President, Mr. E. C. Herring the Vice-President, and Mr. H. Harman, the Hon. Secretary. An entrance fee of 1s. and a weekly subscription of 1d. entitles a member to use the room between certain hours during the day, from 6 p.m. till 10.30 p.m. in the evening, and at other times by permission. The room is provided with a lending library, books, periodicals, and games; but, of course, no money must be played for, nor must there be any betting. Discussions are allowed on subjects which do not touch upon politics or religion. Refreshments can be purchased by members on conditions specified in the rules. About the middle of last month, the members celebrated the twenty-first anniversary of the establishment of the room; and, in order to commemorate the event, each of the members received a nickel and silver-plated medal in a case—others in silver being presented to the Chairman and Directors of the Company. It was designed by Mr. R. Herring, and cut by Messrs. Walker and Hall, of Sheffield, under his instructions. On one side is shown the 1½ million cubic feet gasholder erected at the works a few years ago, with the words "Dover Gas-Works Recreation Room, Established 12th December, 1887," round the outer edge; while on the other are the names of the President, Vice-President, members of the Committee and officers, and the date of the 21st anniversary—Dec. 12, 1908. The holder, in dead silver, stands out well against a burnished background; and the names in raised letters on the reverse of the medal are distinctly arranged. The combined efforts of the designer and the firm who were entrusted with the work have resulted in the production of a very appropriate *souvenir* of an interesting event; and we are sure it will be treasured by its possessors not only for its own sake, but as representing twenty-one years of pleasant social intercourse, which must have had a beneficial effect on all who participated in it.

Reductions in Price in North and East London Suburbs.—The North Middlesex Gas Company and the Lea Bridge District Gas Company have reduced their price 2d. per 1000 cubic feet; the former from 3s. 8d. to 3s. 6d., and the latter from 3s. 6d. to 3s. 4d.

Electric Light Failure at Ashton-under-Lyne.—Ashton-under-Lyne last Tuesday experienced the inconvenience of a failure of the electric light for about half-an-hour. Some of the tradesmen were compelled to close their shops; and many of the tramcars came to a standstill, owing to the cutting off of the current. A mishap at the power station was the explanation of the trouble.



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Reduction in Price at Corwen.—The Directors of the Corwen Gas Company have decided to reduce the price of gas from 6s. 3d. to 5s. 10d. per 1000 cubic feet, as from the 1st inst.

Fatality at the Wallasey Gas-Works.—A man named John Bradley, in the employment of Messrs. Morrison and Sons, Contractors, of Wavertree, who are building a gasholder tank at the Wallasey Gas-Works, while ascending a ladder last Friday, suddenly fell backwards on to the concrete bottom, and sustained a fractured skull. He was removed to the hospital, but died two hours after admission.

Assessment of the Cleethorpes Gas-Works.—The Assessment Committee of the Grimsby Union have given notice to the Cleethorpes Gas Company that they have instructed Messrs. William Marshall and Sons to make a reassessment of their undertaking. The Company have accordingly retained Messrs. W. A. Valon and Son, of Caxton House, Westminster, to advise them generally and look after their interests in the matter.

Price of Gas for Power at Accrington.—The Accrington District Gas and Water Board have adopted a recommendation of a Special Sub-Committee who dealt with the question, to the effect that the scale of charges for gas used for power purposes only be as follows: When the quarterly consumption is 300,000 cubic feet, and does not exceed 500,000 cubic feet, a discount of 2½d. per 1000 cubic feet be allowed, making the net price, when the account is paid on or before the discount day, 2s. 2d. per 1000 feet. When the quarterly consumption exceeds 500,000 cubic feet, a further 2d. per 1000 feet to be allowed on the excess beyond the 500,000 feet, making the net price, when the account is paid as previously stated, 2s. per 1000 cubic feet.

Hull Gas and Water Estimates.—At a recent meeting of the Hull Corporation Water and Gas Committee, the Engineer (Mr. C. B. Newton) submitted his estimate of income and expenditure for the financial year ending March 31, 1910. He placed the income of the water undertaking at £63,995, and the expenditure at £31,650, leaving a gross profit of £32,345. Of the latter sum, he allocated £2600 for contribution to the city fund and £13,525 for sinking fund and interest, leaving an estimated net profit of £16,220. This year's estimated net profits are £15,100. With regard to the gas undertaking, the estimated income was put at £12,220, and the expenditure at £9520, leaving a gross profit of £2700. The interest and sinking fund charges will amount to £2400; thus the net profit will be £300.

Automatic Public Lighting and Lamplighters' Employment in Liverpool.—At the meeting of the Liverpool City Council last Wednesday, the lighting estimates of the Tramways and Electric Power and Lighting Committee for the current year were presented. Mr. Kearney inquired whether, in view of the introduction of automatic lighting, it was intended to make any provision for lamplighters who would be unemployed in consequence. He understood that a large number of men—about 150—might be discharged; and he thought they should not be added to the unemployed. Sir Charles Petrie replied that, so far as he knew, it was not intended to discharge any men. Mr. Boote said there was a resolution on the books of the Committee that no lamplighter would be discharged. Any man whose services were not required in consequence of the introduction of mechanical lighting would be found employment at no less salary than he had been previously receiving.

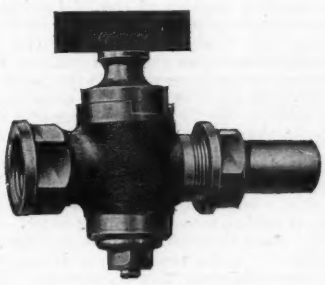
Reinstatement of Paving in Westminster.—At the meeting of the Westminster City Council last Thursday, the Works Committee reported that they had further considered the recommendation referred back to them at the last meeting of the Council, which embodied the results of a conference of the various gas, electricity, and other companies having statutory powers in regard to roads in the city. The conference was called to settle long-standing matters in dispute with regard to the reinstatement of paving after trenches had been made. The Committee intimated that they must adhere to their former report, which was noticed in the "JOURNAL" for the 22nd ult. (p. 846), and again recommended that the action taken by them at the conference, in agreeing with the companies on the various points, should be approved and adopted, and that the companies should be informed of the decision arrived at. The recommendation was agreed to without dissent or discussion.

Sales of Stocks and Shares.—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Messrs. A. & W. Richards sold, by order of the Directors, new issues of capital of the North Middlesex and Southgate Gas Companies and the Southend Water Company. For the first-named Company, they had for disposal £4000 of 5 per cent. preference stock and £3000 of 4 per cent. perpetual debenture stock; and the former fetched £115 10s., and the latter £101 to £102 10s. per £100. For the neighbouring Company they sold £4500 of 5 per cent. preference stock at £115 10s. to £116 10s. per £100. The new issue by the Southend Water Company consisted of 1050 new ordinary £10 shares, ranking for a maximum dividend of 5 per cent. per annum (similar shares carrying 4½ per cent.); and it was all sold at £10 5s. to £10 7s. 6d. per share. On Thursday, Messrs. Hall, Pain, and Goldsmith sold 2000 shares, each of £5 nominal value, and bearing 5 per cent. interest, in the Portsmouth Water Company. The prices ranged from £6 2s. 6d. to £6 5s. each, or an average of £6 3s. 6d. per share.

Birmingham Water for Coventry.—The Coventry Town Council have received from the Birmingham Corporation an account for £1250 for the supply of water from Oct. 1 to Dec. 31 last. By the Coventry Corporation Act, 1907, Birmingham are to give, during a term of sixty years, such a supply of water as Coventry may from time to time require, not exceeding 2 million gallons per day. The Birmingham Corporation are entitled to deliver the water at a rate not exceeding 100,000 gallons per hour; and the price is to be 4d. per 1000 gallons, with a minimum payment of £1250 per quarter. The Birmingham supply is derived from the River Bourne; and it is to be properly filtered before delivery to Coventry. Under certain conditions, Coventry is entitled to require a supply from the Birmingham Water-Works in Wales; the price in this case to be mutually agreed or to be settled by arbitration. An aqueduct has been constructed, at the expense of Coventry, from the Whitacre pumping-station of the Birmingham Corporation to Coundon reservoirs. Last year's profits on the Coventry water undertaking amounted to £6405, out of which £4500 was transferred in relief of the rates.

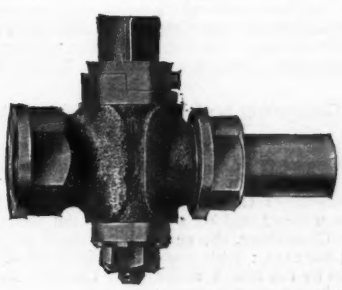
MAIN TAPS

No. 119.



ROUND GASWAY.

No. 61.



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The City of Dunedin are inviting subscriptions for a loan of £206,900, in 4 per cent. debentures of £100 each, at the issue price of £100 10s. The loan is being issued to provide funds for extension of, and additions to, the Corporation's gas-works in the city of Dunedin, and the acquisition of gas-works in the adjacent ward of Caversham, for outlay in connection with the electric light and power undertaking, and for other purposes.

Messrs. Joseph Taylor and Co. have received an order for one of their latest makes of solid plate lead saturators; also orders to cover the saturator base and foundations for the Enfield Gas Company. They have likewise had a further repeat order for two exactly similar saturators from Messrs. John Terry and Co. for export to Australia, making eight saturators ordered within eighteen months. A further order is for one of their latest makes of D-shaped saturators for Messrs. Simon-Carvès, Limited, of Manchester.

According to the "Labour Gazette" of the Board of Trade, the general decline in employment, which began during the second half of the year of 1907, continued last year; and, though there was some slight improvement during November and December, employment at the end of 1908 was worse than at the end of any year since 1892. The prolonged disputes in the engineering and shipbuilding trades, and in the cotton trade, adversely affected employment at many establishments not directly concerned in the disputes.

At the last monthly meeting of the Wokingham Rural District Council, a motion was submitted that the Council should oppose the application of the York Town and Blackwater Gas Company for a Bill to extend their limits for the supply of gas, and to obtain powers to supply electricity, among other places in the parish of Wokingham Without. Mr. E. C. Hughes, in moving its adoption, said the Company had their works in Surrey, and their rateable value was of no benefit to the Wokingham district. The motion was carried.

"Gascolite," the speciality of Clark's Lead and Colour Works Company, of Reading, is being found very useful to large companies who already have stove-cleaning tanks erected, into which they have been in the habit of putting soda and boiling water. It is pointed out that it takes some hours to clean stoves in this way; but by adding 28 lbs. of "Gascolite" to about 120 gallons of boiling water, any stove can be perfectly cleaned in about 20 to 25 minutes. This represents a large saving; and the advantages of the new method over the old would seem to be recognized by those who try it, for the Company state that they are constantly receiving repeat orders.

The minutes of the Gas Committee submitted at the last meeting of the Huddersfield Town Council stated that the question of the purchase of the undertaking of the Kirkheaton Gas Company had been considered. It was decided to request the Directors of the Company to attend before a Sub-Committee; and the Town Clerk was instructed to report upon the powers and position of the Corporation. Consideration had also been given to the question of purchasing the undertaking of the Longwood Gas Company; and the Town Clerk was directed to write asking if the Directors were prepared to reduce the price of gas to their consumers within the Longwood area of the borough.

The City Corporation have been served with notice of appeal to the Quarter Sessions of the County of London by the Metropolitan Water Board against the supplemental valuation list, 1908, for the parish of the City of London. The appeal will be defended by the Corporation. It involves a sum of between £10,000 and £12,000 a year. The Assessment Committee's valuation of the Board's mains, &c., in the City was reduced on appeal. In the provisional list now framed by the Committee, the sum then arrived at is increased by upwards of 25 per cent.; their contention being that, in view of the increase derived by the Board under their Charges Act, the existing valuation is far below what is reasonable.

The James Keith and Blackman Company, Limited, of No. 27, Farringdon Avenue, E.C., have forwarded a copy of a beautifully executed catalogue relating to the Keith 1908 steel plate centrifugal fan, which embodies several features that may fairly be claimed to be distinct improvements in fan design and construction. Additional useful information on the subject is to be obtained by seekers after knowledge from a booklet entitled "Fan Tests, Theories and Facts." Certainly those who contemplate the installation of fans, of whatever size and for whatever purpose, would do well to study the points in favour of the Keith type, which are so convincingly advanced in the printed matter before us. The fans are made in a great variety of sizes and styles.

The dinner of the staff of the Bryan Donkin Company, Limited, took place recently at the Hotel Portland, Chesterfield, under the presidency of Mr. George Clark, the Managing Director, who was supported by Messrs. H. J. Donkin, N. W. Burbidge, and A. G. Webb, three of his co-Directors. The Works Manager (Mr. T. H. Haigh) proposed "The Bryan Donkin Company, Limited," and the toast was cordially honoured. In acknowledging it, Mr. H. J. Donkin, in an interesting speech, traced the history of the firm from the beginning of the Nineteenth Century—which period, he claimed, embraced the whole history of mechanical engineering—the original Bryan Donkin Company being among the first firms to combine in one establishment most of the then known handicrafts. He mentioned several of the great inventions with which the firm has been prominently identified, and referred to the entire lack of technical education in the early days; gentlemen being compelled to obtain the whole of their technical and practical training in such works as those of the Company. He expressed his satisfaction at the continuity of association between the old firms and the new *régime*, and at the expansion of the business which had taken place during the past three years; concluding by thanking the staff for the cordial terms in which the toast had been proposed. Among the other toasts were "The Managing Director," submitted by Mr. H. N. Burbidge; and the "The Chesterfield Staff," proposed by Mr. Clark. A vote of thanks was accorded to the Chairman and Directors of the Company, for their kindness in providing the evening's entertainment.

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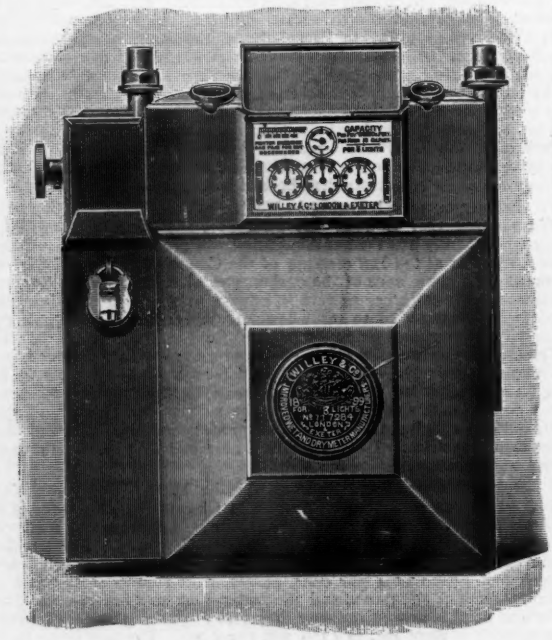

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